

# Land Sector Cost-Benefit Analysis Guidance

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## Introduction

MCC is required by its statutory regulations to conduct cost benefit analysis (CBA) and to calculate the economic rate of return (ERR) on projects supported through country compacts. ERRs form a critical part of the project approval process and are required to equal or exceed a threshold level of ten percent over the medium term. To clarify methodology and to improve the consistency across country compacts, the division responsible for estimating ERRs is developing a series of reports outlining methodology for each major investment sector. This report covers Land and Property Rights (LPR) projects. The guidelines aim to help MCC economists better understand the methodological tools available, and to provide greater methodological clarity to external practitioners. This should help to provide more consistent application of CBA methodology.<sup>1</sup>

The first section of the document reviews the theory and evidence on benefits of LPR investments. Section 2 provides a typology of LPR interventions and associated benefit streams to serve as a starting point for economic analysis. Section 3 presents principles to guide the modeling of LPR investment economic returns.

## 1. Modelling Economic Benefits: Theory and Evidence

LPR investments can increase income primarily through five mechanisms. First, land<sup>2</sup> users are more likely to make welfare-enhancing land-attached investments when they are confident that they can reap the full social return of these investments. Increased perception of tenure security through improvement in land governance, land tenure status, land user knowledge and beliefs, and related legal resources<sup>3</sup> can therefore result in an investment level closer to the social optimum (i.e. the level at which the marginal social cost of land investment is equal to the expected net present value (NPV) of its social return).<sup>4</sup>

Second, individuals and firms are more likely to buy-in or rent-out a parcel of land if they are certain to maintain the tenure right to that parcel after doing so (transferability).<sup>5</sup> This can ensure that parcels are allocated to the individuals and firms that have a comparative advantage in their use,<sup>6</sup> while allowing others to monetize parcels to which they have rights and engage in other activities in which they are more productive. For instance, transfers can give land access to those farmers with a comparative advantage in cultivation while freeing others with land rights to engage in non-farm enterprise work in which they are more productive or to migrate to urban areas.

Third, it has been argued by De Soto (2000) that more secure and formal tenure rights to a parcel of land

will increase the willingness of banks to accept that parcel as collateral for a loan, thereby increasing its owners' access to credit. This credit can be used to finance investments whose returns exceed the cost to banks of providing those loans. In practice, these credit effects have often not been observed.<sup>7</sup>

As discussed below, the willingness of banks to accept land as collateral for a loan also depends on creditworthiness (bankability) of the potential loan recipient, value of the parcel to the bank in foreclosure, and a variety of characteristics of the legal and financial environment. Unless there is compelling contextual evidence in support of a credit effect, it is therefore recommended that credit effects be excluded from the ex-ante ERR of LPR investments.<sup>8</sup>

Fourth, LPR investments may reduce the cost of land administration service delivery.<sup>9</sup> This would include benefits such as reduction in the average cost of registering, mapping and transferring parcels and resolving land conflicts, as well as reduction in time and travel cost incurred by service users. For example, if a LPR activity results in access to land administration services at the district rather than national level, the resulting reduction in user time and travel expense would be an economic benefit. In some cases, the reduction in the cost of land administration services may be large enough to have a meaningful price effect on land registrations and transfers as well, resulting in additional benefits through mechanisms one and two above.

Fifth, LPR investments may redefine the allowed uses of land in ways that reduce the cost of non-land public service delivery (e.g. water and wastewater, electricity, and road infrastructure and public transport), negative externalities from colocation of incompatible uses (e.g. excessive noise or poor air quality proximate to residential areas), or negative externalities from inappropriate uses (e.g. pollution, degradation of common land through overgrazing). For example, an investment that establishes an optimal network of public roadways in an underdeveloped area would reduce the future cost of delivering public services to this area.

The observable benefit streams through which the above five mechanisms increase incomes are effects on the productivity or value of land assets,<sup>10</sup> and net reduction in the cost of public service delivery.<sup>11 12 13</sup> Both the measurement of these outcomes and estimation of LPR investment impacts on them are fraught with challenges, reviewed in detail in section III. Nonetheless, a vast literature examines the impact of LPR investments.<sup>14</sup> Part I.1 reviews cross-cutting issues that emerge from this literature, while sections I.2 through I.6 review the most important evidence on LPR effects through the above five mechanisms.

## **1.1. Cross-Cutting Issues**

### **1.1.1. The Importance of Context**

LPR investment impacts are highly context sensitive. Land rights formalization is unlikely to increase perceived tenure security, for example, in areas where land use rights are already perceived to be secure.<sup>15</sup> Likewise, in many contexts, strengthening and legally recognizing customary or informal rights systems (or providing intermediate rights, such as long term leases)<sup>16</sup> would be substantially more cost-effective at increasing perceived tenure security than formalization via full private/freehold title.<sup>17</sup> In other contexts,

the greater expense required to establish stronger legal rights may be justified by interest from outside investors in entering an area or to allow use of complex contractual structures to facilitate mortgage lending or assembly of land for condominiums (in urban areas).<sup>18</sup>

The presence of complementary inputs is also critical to LPR impact. Effects of improved tenure security perception on investment and transfers is determined in part by land users' access to input and output markets, credit access, and household assets. Credit constrained households, for example, may increase land-attached investment in response to improved tenure security while also reducing other household investments.<sup>19</sup> For this reason, LPR activities are sometimes implemented in concert with a broader package of agrarian or other market reforms.<sup>20</sup> Contextual heterogeneity in potential impact is an important consideration in both designing and geographically targeting LPR investments.

In a systemic review of 20 quantitative and qualitative studies, gains in land productivity were shown to be significantly higher in South America and Asia and in “wealthier settings” than in Sub-Saharan Africa. It is unclear whether this is due to what authors call a “wealth effect,” in which lower levels of wealth can explain lower levels of investment and productivity, or an “Africa effect,” in which the efficiency of pre-existing customary land tenure systems are underestimated by researchers, thereby causing them to overestimate potential returns. In other words, “insecurity is not present to the degree by which researchers estimate,” so the differential between pre-reform security and post-reform security tends to be lower than anticipated. Customary land tenure systems are diverse, but in many cases confer rights that are held for life, inheritable, and considered a social right.<sup>21</sup>

Likewise, within a given context, LPR investment effects on economic outcomes are likely to be highest for sub-groups with lower baseline tenure security. For example, the positive effect of land tenure rights on investment in soil conservation for women was found to be double that for men in Rwanda. Likewise, the effect of land titles on investment in conservation in Vietnam was also highest among landholders that faced greater threat of land reallocation. In areas that lacked a threat of land reallocation, there was no difference in investment among those with land titles and those without.<sup>22</sup>

Sustainable LPR investment impacts are contingent on both investment design quality and design compatibility with the characteristics of the local context. An analysis on the effects of land titling on agricultural productivity in Madagascar, for example, found no relationship: After their initial establishment, titles were rarely updated due to the prohibitive time and financial cost of doing so when land was traded, passed down, or divided into smaller parcels.<sup>23</sup> As a result, formal titles no longer reflected current rights and the system fell into disuse. Likewise, a recent analysis of the sustainability of Rwanda's land registry following a nation-wide program of first-time land tenure regularization emphasized the importance of planning the registry set-up and operations phases jointly with a clear analysis of the social benefits, private benefits to each user type, and potential matches between these and financing options.<sup>24</sup>

In many contexts, incorporating public awareness campaigns may increase or even be necessary to achieve any LPR investment impact. Following the initiation of land rights reform in Uganda, for example, researchers found that households with greater knowledge of their newly acquired rights had up to 20% higher agricultural output and 25% higher land values.<sup>25</sup> Moreover, awareness campaigns may

disproportionately benefit the disenfranchised. In Benin, female-headed households were less likely than male-headed households to be aware of land tenure reform activity, and also less likely to take part in meetings on rural land use plans.<sup>26</sup> Awareness raising and related trainings are equally key for government and local officials who may be unaware of the details of newly passed legislation or new systems and procedures. Often *de jure* legal reforms are not implemented due to lack of awareness, financial resources or capacity.

Overall, the findings highlight the importance of the institutional, economic and political context in which reforms will be implemented to achieving desired outcomes. As noted by Lawry et al. (2014), land tenure programs cannot be “effectively implemented unless they are fully embraced by national governments, cognizant of the political costs and benefits to implementation, and prepared to bear the high fiscal costs of implementation.”<sup>27</sup> Moreover, sufficient resources and user demand must be in place to maintain land administration systems once they are established. Key national and sub-national moderating factors to consider include governance, social norms and practices, land use, and markets.<sup>28</sup>

### 1.1.2. Potential for Unintended Consequences

Tenure formalization investments designed without proper understanding and recognition of existing customary or informal primary and secondary land use rights can result in competing claims on plots that reduce tenure security, or outright loss of use rights for particular sub-groups.<sup>29</sup> In Sub-Saharan African countries with pre-existing customary land tenure systems, conversion of these systems to European-style land rights systems have “rarely occurred historically without considerable social and economic displacement.” In these cases, much of the fear of displacement is fear of the state rather than individuals.<sup>30</sup>

This risk is especially high for women and marginalized groups. Women often hold property rights via intermediary men, who have more power to enforce those rights. Poorly structured LPR reforms may not only be insufficient in redistributing wealth to the poor, but can actually deepen inequalities.<sup>31</sup> In Kenya, it was found that while land tenure reforms created a land-holding class, it also created a landless one, namely secondary rights holders such as women. Authors of this systematic review stress the importance of studying customary land tenure systems, and note that Mozambique, Kenya, and South Sudan stand out as “pioneering” the statutory recognition of community-based land rights.<sup>32</sup> Likewise, a well-intentioned pilot LPR project in Rwanda increased the tenure security of married women, but inadvertently reduced the tenure security of unmarried women.<sup>33</sup> Where statutory recognition is given to customary or communal land administration systems, it may be possible to reduce potentially negative distributional effects through reforms that make traditional land authorities accountable to public oversight, or reassign their responsibilities to civil land boards.

Likewise, the rights of pastoralists must be identified and incorporated into LPR program design and implementation to avoid unintentional marginalization and increases in conflict between pastoralists and sedentary farmers. Because pastoralists may not be members of the local community and may not be present at the time of participatory land use planning exercises, there is a risk that their rights are not be documented and protected. In Niger, for example, MCC staff have found that land right conflicts between nomadic pastoralist and sedentary farmers are quite common.

Fortunately, when carefully structured to mitigate risks to sub-groups, LPR investments have potential for very positive distributional effects. The poor have more to gain from LPR reform, since informal rights tend to be weaker for those low in the political hierarchy, which disproportionately includes women and the poor.<sup>34</sup> Increases in investment as a result of land tenure security have also shown diminishing returns as total size of land holdings increase.

### 1.1.3. Effect Period and Endogeneity

Even where LPR investments have positive long-term impacts, these effects can take time to manifest. The effect period length depends on factors such as land users' access to credit, input and output markets. Effects on intermediate outcomes, such as perceptions and investment, will occur first with resulting productivity impacts typically lagging (e.g. a tree planted may take several years to mature). It is widely known that systematic registration programs can increase conflicts and reduce rentals over the short-run as individuals and firms attempt to establish land claims and dormant conflicts come to light.<sup>35</sup> There is limited empirical analysis of the dynamics of these short-run effects, however, with the exception of preliminary evidence from Goldstein et al. (2015), who show that more precise demarcation of land boundaries in Benin was followed after 11 months by a 1.5 percentage point decline in the proportion of parcels rented out versus control parcels, relative to the baseline of 6 percent. The authors hypothesized that this resulted from landowners' efforts to reassert their land rights by taking back property that they had been renting out, in order to stake a claim during the certification process.<sup>36</sup> Lastly, endogeneity concerns are a major obstacle to the econometric estimation of LPR investment effects. These concerns are discussed in detail in section III.

## 1.2. Land-Attached Investment

Actors are more likely to invest in a piece of land when they are confident that they can appropriate the full social benefit of that investment. LPR investments that improve tenure security can therefore result in an investment level closer to the social optimum (i.e. the level at which the marginal cost of additional land investments is equal to the expected net present value (NPV) of returns from those investments). An extensive body of empirical literature supports this link between tenure security improvements and increases in land-attached investment. Investment types commonly analyzed include soil<sup>37</sup> and water conservation, livestock, machinery, crops and trees, improvements to residential housing and, in urban areas, construction of high-rise residential and commercial buildings. Three channels of particular importance are cropping decisions, infrastructure investment, and environmental conservation.

### 1.2.1. Cropping Decisions

Land and transfer rights are associated with longer-term investment strategies, such as the allocation of land to perennials, trees and higher-value export crops.<sup>38</sup> Trees take many years to reach maturity, and therefore require a long-term investment horizon. In Ethiopia, for instance, the granting of land transfer rights resulted in a 46% increase in land allocated to perennials. In Nicaragua, owner cultivated plots were 24% more likely to be planted with trees than tenant cultivated plots.<sup>39</sup>

While tree crop and perennial investment are the most common outcomes examined in the literature, some studies have focused on the adoption of export crops. In Peru, possession of a land title was found to strongly predict a farmer's shift from production for the domestic market to production of export crops requiring a greater up-front investment. As a result, these export-oriented farmers were less likely to be poor.<sup>40</sup>

In Benin, MCC funded one of the first randomized controlled trials<sup>41</sup> of a land certification program to examine the link between demarcation—the first “key step” in the land rights formalization process—and investment.<sup>42</sup> As expected per the project logic, no statistically significant effect on agricultural productivity was detected at mid-line (2-years following demarcation). However, demarcation of plots had caused a 2.4 percentage point (p.p.) increase in parcels planted with perennial crops and 1.7 p.p. increase in parcels with a tree planted during the past 12 months.<sup>43</sup> At endline (four years later), the study found that demarcation had caused a 3.2 p.p. increase in parcels planted with perennial crops.<sup>44</sup>

### 1.2.2. Private Infrastructure

LPR reform may also increase investment in land-attached infrastructure, although there is limited empirical evidence of infrastructure effects in rural areas. Bardhan, Mookherjee, and Kumar (2012) found that land tenancy registration reforms in West Bengal had a direct (Marshallian) effect on tenant demand for groundwater, which in turn incentivized groundwater sellers to invest in groundwater capacity with high fixed costs (tubewells, dugwells and submersible pumps). These investments subsequently reduced the price of groundwater, resulting in a positive spillover effect on non-tenant plot groundwater use as well. This increase in groundwater use raised productivity on both tenant and non-tenant plots.<sup>45</sup>

In urban areas, formalization of land rights in informal settlements has been found to increase physical housing investment. In Peru, providing formal titles to informal settlement residents substantially increased investment in roofs, securing home foundations, painting walls, installing floors, and general home expansion. In Argentina, providing formal titles to informal settlement residents likewise substantially increased physical housing investments: Over the span of four years, the overall index of housing quality within the settlement rose by 37%.<sup>46</sup>

Land rights formalization can also incentivize investment in high-rise buildings in central urban areas. Henderson, Regan, and Venables (2017) apply a general equilibrium dynamic monocentric city model to estimate the potential welfare effects of formalizing land rights in informal settlements in Nairobi to enable investment in high-rise buildings near the city center. After calibrating the model using a combination of remote sensing data from 2003/2004, household survey data from 2012, and land price data scraped from a property sale website for 2015, they find that the immediate conversion of all informal land in Nairobi would yield an aggregate gain of \$759 million in present value versus the counterfactual of informality in perpetuity. This is equivalent to a welfare gain of \$13,000 per household living in Nairobi's informal settlement areas, where median housing expenditure is \$260 per annum. The welfare gain versus the counterfactual of conversion of all informal areas in 30 years is PV \$125 million, or \$2,141 per informal settlement household.

Regulatory reform to remove building height restrictions can similarly incentivize investment in high-rise



buildings in central urban areas. Bertaud and Bruecker (2005) estimate the welfare cost imposed by Bangalore's building height restriction at between 3 and 6 percent of household consumption. Similarly, Lees (2014) applies a simple, calibrated monocentric city model to estimate potential gains from removing building height restrictions, density restrictions and other regulations in Auckland, and finds an average household gain of \$933 per annum. These estimates do not account for the loss of some public amenities, such as improved views, that would result from removing height restrictions.

Glaeser, Gyourko and Saks (2005) analyze the effect of building height restrictions in Manhattan while attempting to account for the negative externality of increased heights on building views. The analysis shows that the price of a Manhattan high rise floor is typically more than twice its supply cost, and presents evidence that height restrictions are the primary cause of this gap. They apply a hedonic price regression to estimate the negative externality on views that would result from removing height restrictions, and find that this would justify a construction related regulatory tax equal to only 12.5% of apartment values. The value of views or other amenities resulting from land use regulations will, of course, vary by context. In estimating the effect of removing city level building height restrictions on land rents, it is also important to account for general equilibrium effects, since land rents will increase in the central business district, but reduce at the city outskirts.<sup>47</sup>

These monocentric city models typically incorporate effects of increased building heights on economies of scale in building construction,<sup>48</sup> and reduction in transport costs resulting from households relocating closer to the central business district. Many analyses exclude negative crowding externalities, however, that can result from increasing building heights including blocked views, increased pollution in inhabited areas and possibly reduced public service quality (in contexts where public service capacity in the central business district is insufficient). Many analyses also exclude potential positive externalities in the form of reduced road congestion for households remaining in the city outskirts, economies of agglomeration in production and consumption, and possibly reduced public service delivery cost (in contexts where users are not charged the full cost of these services).

### 1.2.3. Environmental Damage

Improved land governance can reduce costly environmental degradation resulting from coordination failures, poor land planning, unsustainable natural resource management, and weak protection of public interests. Land tenure security is associated with greater investment in soil conservation, erosion mitigation, and tree planting. Improvements in tenure security may also reduce deforestation, although other factors are stronger determinants and the relationship may vary by context.<sup>49</sup> Weak protection of land owned or managed by the state can likewise lead to deforestation through conversion of forests to farmland, or other private uses.

In Uganda, farmers with weak tenure security were incentivized to maximize short-term output, resulting in greater inorganic fertilizer application. Farmers with stronger security, however, were incentivized to preserve long run output, resulting in a shift toward organic fertilizer application. Tenure security provides farmers with “longer planning horizons,” which can incentivize them to adopt sustainable and environmentally beneficial practices such as soil conservation, organic fertilizers and land fallowing. Likewise, a 2007 study found that farmers and land owners who were assured they would be able to

remain on land and pass it to their inheritors had a strong interest in preserving the land for future use.<sup>50</sup>

Tenure security can also lead to a decrease in deforestation. Residents of forested areas in Thailand that lack tenure security, for example, have been shown to cut down trees and plant perennial crops in their place as a means of documenting their long presence on the land and, eventually, petitioning for formal titles to the land.<sup>51</sup> While this study focused on a particular region in Thailand, the authors noted similar findings in research from other low-income countries. In Sumberjaya, Indonesia, conditional and temporary land tenure was used to incentivize farmers to commit to ceasing deforestation practices on 10% of Indonesia's remaining forested land. Impact evaluations showed that deforestation rates decreased and farmers' incomes increased by almost 30% by removing the necessity to pay bribes to avoid eviction.<sup>52</sup>

In Brazil, fear of government-led, rental-targeted expropriation policies discourages landowners from renting unused land to more productive users. This disconnect between supply and demand causes farmers to expand outward from vacant land to the Amazon rainforest. According to Alston and Mueller, corrective land tenure reform policies could slow this destructive degradation of the Amazon, and also increase productivity.<sup>53</sup>

For land policy reforms to have a lasting effect, however, property rights must be recognized in the cultural, ecological, social, and legal context. For example, many indigenous communities engage in communal property rights, as opposed to individual rights. This can be an advantage in the case of land tenure reform's environmental effects, as is shown in Ecuador, where these communities have been noted to have a more long-term and sustainable "vision" of land use than individuals. It has been increasingly seen as beneficial to transfer the authority of moving resources such as wildlife or water, which are usually owned by the state, to more local authority, such as "user groups." In Ecuador and Indonesia, communal tenure systems provided favorable special arrangements, as opposed to the common fragmenting caused by private demarcation, as well as more resilient contracts through social sanctions.<sup>54</sup>

Conversely, a later study of property rights in Ecuador found that there is very little evidence demonstrating a direct link between titling and forest cover, and that research that attempts to draw conclusions on the relationship between tenure formalization and deforestation based on simple regressions is dangerous and "on weak empirical footing." More research is needed to rigorously examine links between property rights and deforestation.<sup>55</sup>

### 1.3. Land Transfer

LPR interventions can also improve productivity by incentivizing the transfer of land parcels to parties who have a comparative advantage in their use. This increases productivity both by transferring land to households and firms who are able to use land relatively more productively and by allowing households and firms leasing-out or selling land to engage in other, non-land intensive activities in which they are relatively more productive. For instance, Jin and Deininger 2009 show that land rental in China increased productivity per hectare by 60%, with one third of these gains allocated to landlords and two thirds to tenants. This resulted in a net increase in tenant income of 25%, and an even greater increase in the income of households leasing-out land through transition into non-farm employment. Similar gains from

efficiency and productivity were observed in Albania, Vietnam and Hungary.<sup>56</sup>

Land tenure security in the presence of land administration services with the capacity to efficiently register transactions encourages growth of the land rental market, which is associated with greater access to land by the poor.<sup>57</sup> Both land tenure security and functional rental markets are also associated with economic growth through more efficient use of land. Conversely, when landlords feel insecure about their land rights, they may choose not to rent out land for fear it would be expropriated.<sup>58</sup> Strengthening land and property rights can lead to a greater sense of security among households, which in turn leads to greater participation in the land rental and sale markets by both renters and landlords. This spurs the reallocation of land from less efficient to more efficient users through the rental market, and increases the likelihood that users will have the opportunity to profit from economies of scale.<sup>59</sup>

Much of the literature focuses on the positive effects of land rights on the size of the land rental and sale markets. This growth in the land rental market was observed across geographical regions and cultures: specifically in Albania, the Dominican Republic, Ethiopia, and Vietnam.<sup>60</sup> In each of these countries, researchers were able to connect the institution of formal land rights with greater participation in the rental and sale markets. The geographic diversity of these findings suggests that “the provision of clear, enforceable, and secure long-term [land] rights is an essential pre-condition for the operation of land rental market”<sup>61</sup> and could hold true in various regions and communities.

The reduction of user fees for registering land transfers and other land administration activities has also been shown to increase land market activity through a price effect. When additional costs are added to a transaction, buyers and renters compensate by lowering the price they are willing to pay, while sellers and lessors raise the price that they are willing to accept. This reduces the overall volume of land transactions and may increase the portion of transactions that are informal.

Researchers have found several positive outcomes of increasing land market activity. One such outcome points to improving land access for poorer households. The rental market provides an opportunity for those effectively shut out of the land purchase market to gain access to land. In the Dominican Republic, for example, researchers found that through improvements in the “security of property rights, the area and the number of plots rented to poor tenants would increase by 63–65%,” and a similar redistribution was found in Vietnam. In Albania, however, a growing rental market occurred but did not necessarily benefit the poor. In this instance, land access improved for those members of the community that were simply the most interested in agriculture, regardless of their level of income.<sup>62</sup>

Another major outcome of stronger land rental and sale markets resulting from land tenure security is the transfer of land to more productive users. In the absence of sufficient land security, land holders tend to rely on social sanctions to enforce land transfer agreements, thus making transactions with persons outside of the community inherently more risky. This uncertainty can lead to sub-optimal market participation and inefficient market segmentation from efficient users to users who are less efficient, but are in the familial network of renters.<sup>63</sup> This efficiency differential is indicated in rental prices that are 80% higher to non-relatives than to relatives (although this could also be explained by families’ desire to sacrifice profit in order to help other members of the family or community).

In many contexts, households with low tenure security who would otherwise engage in non-farm work continue to cultivate parcels out of fear that the parcels will otherwise be expropriated. A related phenomenon in urban informal settlements is maintenance of a physical presence on parcels to establish ownership by household members who would otherwise enter the labor market. As land was legally secured in informal settlements in Peru, for example, subjects were shown to have been more likely to join the labor force, possibly as a result of no longer needing to maintain physical presence on the land to ensure claim over it. Men, who tend to have greater earning potential outside of the home, are the most likely to stay at home to defend the property when land rights are not secure.<sup>64</sup>

Lastly, there are some caveats presented in the literature. In Albania, land rights had a limited effect on rental market participation. The most important determinant of participation was years of formal education, which was found to be inversely proportional to agricultural labor market participation. Those with higher levels of education were more likely to rent out their land and less likely to rent in additional land. The effect of education on the Albanian rental market was much greater than the effect of land rights. In Hungary and China, where land titles have already been distributed, high transaction costs limit the transfer of land through sale or lease.<sup>65</sup>

Evidence from Hungary also shows that search and administrative transaction costs can remain an obstacle in the land rental market even after a land tenure reform and titling process has been completed. Similarly, in nearby Albania, transaction costs remained high following the implementation of a land tenure reform and titling process. Landowners in that country used intra-family transfers and inheritances to circumvent the high transaction costs. This suggests that following land tenure reform, transaction costs can remain a major obstacle to an efficient land rental/sale market.

While establishing strong but less-transferable (inalienable) rights inhibits land sales, it can sometimes facilitate land rentals. This is because having strong rights that cannot be transferred to others makes it easier for the landlord to reclaim the property at the end of the lease period,<sup>66</sup> but nearly impossible to sell the land outright. A similarly weak sale market for land can be observed in communities reliant on customary rights due to the inalienability often associated with this type of land rights. USAID's 2015 exploratory analysis found that in Liberia, Zambia, and Guinea, where customary land rights are mostly inalienable, 80% of interviewed Liberians reported that they do not have the right to sell their land, 6-7% of Zambians reported renting or borrowing land from other households, and only 3% of Guineans reported rental income in 2014.<sup>67</sup>

## 1.4. Access to and Cost of Finance

It is theoretically possible that LPR reform can allow households and firms to pledge property as collateral against loans and thereby increase access to credit that finances investments whose returns exceed the cost to banks of providing those loans, as argued by De Soto (2000). The willingness of creditors to accept and borrowers to offer land as collateral for a loans, though, also depends on the sophistication of the legal system (ability to protect both borrower and creditor) and financial sector, as well as the income level of potential borrowers and the size and location of the parcels to be used as collateral (creditworthiness of the potential borrower, and value of the parcel to the creditor in foreclosure).

In practice, the balance of empirical literature has found little to no effect of LPR reform on credit access. While some regions (such as Cambodia, Guatemala, Ethiopia, and Argentina) have demonstrated a rise in the provision of credit following the institution of land rights policy, the effects were very modest. In these cases, a land title supplied the borrower with a form of collateral. This additional collateral allowed persons to obtain a loan that would not have been available to them otherwise, or enjoy a small reduction in interest rate relative to a similar loan that lacked the backing of collateral.<sup>68</sup>

When investigating the effect of land rights on credit, it is necessary to consider the sophistication of the region's financial and legal systems and the types of institutions providing the credit. For example, the possession of a land title has a greater influence over credit decisions in regions with a longer tradition of market-based economic policies. The free-market traditions in southern Vietnam relative to the centrally-planned economy of northern Vietnam is a good example of this discrepancy. In southern Vietnam, certification increased the likelihood of obtaining formal credit by as much as 14%. In northern Vietnam, on the other hand, the effect of certification was not significantly different from zero in most estimates. Likewise, a formal financial institution is more likely than an informal one to consider a land title when making a credit decision. Large, national banks that explicitly consider collateral are more likely to provide credit to titled applicants than are smaller institutions or informal channels, such as moneylenders or family and friends. One example of this was found in Argentina, which exhibited a modest uptick in mortgage credit as a result of land title, but no effect for other forms of credit. A 2015 systematic review of proposed reasons for this include unattractive characteristics of the properties and the weak "bankability" of the borrowers. Therefore, these effects are somewhat more likely in urban areas and in contexts with larger, more bankable potential lenders.<sup>69</sup>

Offering credit to low-income borrowers collateralized with small plots of land is often unprofitable for banks. Moreover, poor households with few assets beyond the land are often unwilling to risk losing the land by putting it up for collateral and so rely instead on credit through traders, ROSCAs, or group lending.<sup>70</sup> Because of this, the benefits from increased credit access may disproportionately accrue to higher income households.

The possession of a land title is often not the constraint to bank lending to low-income consumers, but rather the inadequate enforcement of land rights laws and policies. In the case of Peru, land titles have little value to banks and other lending institutions, because the government has failed to endorse the formal land rights it has issued. Similarly, there is no legal mechanism in Vietnam for banks to seize property in the case of default.<sup>71</sup> In both instances, a land title alone cannot serve as an adequate form of collateral to support a loan. Without the legal underpinning to support timely foreclosure, the land title itself has little to no effect on the supply of credit in an economy.

## 1.5. Cost of Land Administration Service Delivery

LPR interventions can also directly reduce the administrative and user costs of executing land transactions, first time registration and mapping of parcels, and resolving land conflicts. Costs include the actual administrative cost of delivering services, which may differ from the user fee charged for the service, as well as any user costs not paid to the land administration institution (such as vehicle operating

and opportunity costs of travel to land administration offices). The magnitude of direct benefits from cost reduction will depend on 1) the size of the potential cost reduction, and 2) the total volume of administrative processes targeted. One indication of the potential for efficiency improvement investments to reduce costs is the substantial variation in parcel registration costs. The cost of registering a parcel transfer for 173 countries included in the World Bank's 2008 Doing Business Survey was 2 percent or less of the parcel value for 19% of cases, but 5 percent or 10 percent for 53% and 24% of countries, respectively.<sup>72</sup> In Lesotho, the total days required to register property declined from 101 to 43 following introduction of a new Land Law in 2009 and related establishment and capacity building of the Land Administration Authority to implement the new Land Law and streamline procedures as part of MCC's Lesotho I Compact. In Jamaica, institutional and administration reforms reduced property registration and transfer times from 70 to 30 and 25 to 5 days, respectively, while reducing survey check times from 182 to 35 days. During the same period, the proportion of agency costs covered by revenues increased from 50% to 75% while total expenditures rose from 320 to 615 million JMD in nominal terms.<sup>73</sup>

Although less common, LPR interventions may also target reduction in the cost of existing systematic registration and mapping activities. While early land titling projects were often cost inefficient, advances in project design, information technology and remote sensing have potential to drastically reduce the cost of some LPR interventions.<sup>74</sup> One source of past inefficiency has been overstatement of the effect of mapping precision on tenure security, which led to overspending on surveying precision. Since surveying cost increases exponentially with increased precision, this resulted in bilateral or multilateral funded first-time registration projects that cost on average \$20-\$60 per parcel, and sometimes above \$100 per parcel. In contrast, use of low-cost certification methods with high community participation in Ethiopia allowed registration of 20 million plots at under \$1 per parcel.<sup>75</sup>

## 1.6. Land Use Regulation

LPR investments may introduce regulations to redefine the allowed uses of land in ways that reduce the cost of non-land public service delivery (e.g. water and wastewater, electricity, and road infrastructure and public transport) or negative externalities from colocation of incompatible uses (e.g. excessive noise or poor air quality proximate to residential areas).<sup>76</sup> For example, Paul Romer has highlighted the importance of establishing and publicly securing arterial roadway grids in undeveloped areas before private investment occurs. Early definition of the arterial grid and securing it to the state averts the high cost of either converting private land to public use in the future or allowing the persistence of informal settlements without access to public services.<sup>77</sup> In Peru, residents of informal settlements paid high prices to access water from private providers until formalization of land allowed access to services at a lower price and higher quality.<sup>78</sup> LPR policies may also aim to incentivize land-attached investments in areas where public service delivery capacity is greater or will be less expensive to expand in contexts where users are not charged the full cost of delivery of these services.<sup>79</sup>

## 1.7. Perception of Tenure Security Improvement Mediated by Conflict Reduction, Inheritance Rights and Other Intermediate Outcomes

Several studies examine the effects of LPR interventions on intermediate outcomes that affect household

incomes through the above mechanisms. For example, much of the literature finds that land titles are associated with a lower incidence of land conflict, a decrease shown to be as high as 20%. This reduction in land conflict is, in turn, associated with increased investment and transfer of parcels, resulting in higher productivity. In Burkina Faso, tenure insecurity resulting from perceived risk of land conflict or expropriation was found to reduce overall agricultural productivity by 9%. The effect of land titling on conflict is greater in regions where the number, duration required to resolve and severity of conflicts is high. Even in contexts where few conflicts occur, serious conflicts may increase the perceived risk of conflict for a large number of households, discouraging investment and land transfer, especially when these conflicts are with parties external to the community (government authorities, herders, etc).<sup>80</sup>

Likewise, many studies investigate LPR effects on perceptions of inheritance rights, an important determinant of perceived tenure security. Two recent studies in Rwanda found that land tenure reform pilots there increased certainty regarding who would inherit land. Both studies saw a reduction in “succession-related uncertainty” and, interestingly, girls were nearly as likely as boys to be the named inheritor of land in most situations. This near gender equality, however, broke down among very poor and female-led households: two instances in which boys were more likely to inherit. The authors noted, however, that the preference for male heirs in these cases seemed to arise from cultural norms rather than from the land tenure regime itself. To the point of inheritance, data suggest that the family members most likely to pursue a career in agriculture tend to inherit the land, serving as an example of greater production efficiency through inheritance.<sup>81</sup>

## 1.8. Conclusion

Well-designed LPR investments can achieve benefits through a variety of channels, including land-attached investment levels closer to the social optimum, allocation of plots to more efficient users, reduction in the user and administrative costs of delivering land administration and other public services and, in some contexts, increased access to credit. LPR impacts, however, are highly sensitive to local context, including baseline levels of tenure security and functionality of existing systems, the presence of complementary inputs on which economic impacts are contingent, and the supporting political and institutional environment. Effects are also highly sensitive to the quality of the project design and the degree to which it is tailored to the local context. Where the local context is inappropriate for a LPR intervention or projects are designed without awareness of existing systems and conditions, LPR investments can have neutral or even negative economic and distributional impacts. Even for cases where the impact of LPR investments are positive, the trajectory of this impact may be non-linear. Lastly, the estimation of potential LPR project effects is fraught with endogeneity concerns, discussed in detail in section III.

## 2. LPR Investment Typology, Economic Logic and Analytic Requirements

LPR investments include a wide range of context-specific activities for which an exhaustive taxonomy is difficult to assign. Many LPR investments also include multiple activity types. For example, MCC

investments have often combined activities that clarify and publicly record land rights with reforms to land governance policies and institutions, and improvements to land administration systems. Despite the wide range and frequent combination of activities in practice, Table 1 attempts to broadly group LPR activities in a way that is useful for considering estimation of their economic rates of return (ERR). Based on the table, this section defines 6 investment types, along with their benefit streams and the data required to estimate their magnitude.<sup>82</sup> Section III presents principles to guide the selection of existing data (and where necessary collection of original data), as well as the selection and application of methods to estimate the magnitude and distribution of LPR investment benefits and costs.

## 2.1. Clarification of Property Rights and Boundaries

Many LPR investments focus on clarifying property rights and boundaries. These activities often resolve land conflicts, more formally recognize land use rights, map parcel boundaries, and/or securely record and publically display land use rights and parcel boundaries in a formal registry, cadaster or other public record. These investments commonly involve the delivery of policy inputs that expand the coverage of existing land administration institutions and their services to new areas. As discussed above, the economic logic for these activities is that clarifying property rights and boundaries will improve perceived tenure security, leading to increased investment, land transfer and (in more limited cases) credit access.

To inform CBA of these investments, the analyst should ideally obtain data on perceptions of tenure security, land value (if land market functional), incidence of land conflict, land investment (including housing), land transfers (sale/rental) and demand for and use of land administration services both in potential investment areas and, if possible, in similar areas where the proposed land administration services are already provided and/or property rights and boundaries are relatively clear. For rural areas, the analyst should also obtain household data on agricultural production, non-farm enterprises and wage employment; while for urban areas the analyst should obtain data on household-based business activities and any mortgage registrations. In some contexts, data on credit access and use may be necessary as well. In addition, the analyst should obtain administrative data from the implementing partner(s) including the number and cost of registrations, mappings, transfers, conflicts resolved, and mortgages/mortgage bonds, as well as administrative land transaction times.<sup>83</sup>

## 2.2. Building Capacity of Land Administration Institutions

Other LPR investments aim to improve the efficiency of national, regional and local land-administration authorities (which may include traditional authorities and land boards) through streamlining and strengthening institutions, operations, procedures and information technology. This may include, for instance, the development and installation of land information and transaction systems (such as computerized registry and cadaster databases, as well as systems to link these databases with courts, banks, the tax authority and other agents); installation of geospatial mapping infrastructure; financial/HR capacity strengthening; staff training; improvement to the capacity of courts or other conflict resolution institutions to process and resolve land conflicts predictably and speedily; improved development and management of industrial zones; decentralization or even the establishment of a new agency. The economic logic of these activities is that they will reduce the cost of land administration service delivery



(including administrative costs of land conflict resolution), and/or improve its quality such that perceived tenure security increases leading to increased investment, land transfers and credit access. These activities may also be a necessary precondition for or improve the quality of land use planning activities (considered separately below).

Cost savings can be calculated as the reduction in the average cost of registering, mapping or transferring a parcel, resolving a land conflict, or verifying a parcel's boundary and owner to facilitate transactions and enforcements (by courts, banks, the tax authority, etc) times the incidence of these activities. The average cost estimate should include data on any time and travel cost incurred by service users. For instance, if the activity allows users to access land administration services at the district rather than national level, the resulting reduction in user time and travel expense should be reflected in the cost reduction.

Administrative data obtained for the ERR calculation should include the total number of registrations, mappings, transfers, conflicts resolved, and verifications of parcel boundaries and ownership (to facilitate transactions and enforcements) occurring per year, and the total fixed and variable costs of administering them. Administrative data on the mean number of user visits and total time required to complete a given administrative process should be collected as well.<sup>84</sup> If available, any survey data on users' cost of travel to nearest service center and opportunity cost of time (ideally the user's wage) should be obtained, as well as data on the return on investments delayed by the total administrative process time relative to the return on the next best use of that investment capital during the processing period. Information on the extent of informal transactions and the reason for informality (high formal transaction costs, lack of information, etc) within areas covered by a formal land governance system may also provide useful information on risks to the sustainability and effectiveness of that system. If the activity is believed to increase the quality or uptake of land administration service delivery, the data listed above under clarification of property rights and boundaries should be collected as well.

## **2.3. Increasing Awareness of Land Rights, Regulations and Administration Services**

Another common investment type targets increased awareness of land rights, regulations and land administration services. This includes public awareness and education campaigns to inform individuals of their land rights and to encourage use of registration, mapping, transfer and conflict resolution services. The economic logic for these activities is that they increase perceived tenure security both directly by changing knowledge and beliefs, and indirectly by increasing use of formal registration, mapping, transfer, and conflict resolution services. This increase in tenure security, in turn, increases investment, land transfer and credit access.

The main benefit streams and ERR data requirements are the same as those listed under clarification of property rights and boundaries above. Data on the extent of informal transactions and the reasons for informality (high transaction costs, lack of information, etc) within areas covered by a formal land governance system may also provide useful information on risks to the sustainability and effectiveness of that system. In addition to those data, M&E data should ideally be collected on individuals' exposure to the campaign, change in knowledge, change in belief, and resulting change in behavior to inform the

Closeout and Evaluation-Based CBA Models.

## 2.4. Land Use Planning and Natural Resource Management

LPR investments may also aim to improve land use planning and natural resource management. This includes activities such as urban planning, land use classification, land resource mapping, and community-based natural resource management. As discussed above, the economic rationale for these investments is that they redefine the allowed uses of land in ways that reduce the cost of non-land public service delivery (e.g. water and wastewater, electricity, and road infrastructure and public transport), negative externalities from colocation of incompatible uses (e.g. excessive noise or poor air quality proximate to residential areas), or negative externalities from inappropriate uses (e.g. pollution, degradation of common land through overgrazing).

For land use planning investments expected to substantially reduce the cost and improve the quality of future non-land public service delivery, the analyst should ideally obtain data on the cost of service delivery in similar areas with and without the land use planning improvements under consideration. The analyst should consult the respective sector guidelines (e.g. WASH, Power, etc) to determine data requirements to estimate potential benefits from improved access to and quality of each service the LPR investment is expected to affect. For activities aiming to reduce incompatible or inappropriate use of parcels, data on land values and/or agricultural productivity and their respective determinants (including the cost of any land-attached investments), and information on proximity to the incompatible/inappropriate use the activity seeks to relocate/reduce should be obtained. Similar data should be collected for activities expected to improve management of common parcels, both for potential project areas and for similar parcels that are better managed.

## 2.5. Legal, Regulatory and Policy Dialogue and Reform

While the above four investment types affect beneficiaries more directly, many LPR investments affect beneficiaries indirectly by supporting partner government efforts to design, authorize and implement legal, regulatory, and procedural and policy reforms. This would include activities to develop the legal, regulatory, procedural and policy foundations for land administration and land management, establish a new land administration authority or court/judicial institution, adapt regulations to better implement existing land laws, reform procedures to streamline and simplify, and build capacity and awareness of public officials responsible for designing, authorizing and implementing reforms.

Since these reforms ultimately impact beneficiaries through one or more of the four direct activity types above, they have the same benefit stream categories as the direct activity they aim to affect, but with the additional cost streams (and risks) of the preceding reform design, authorization, and implementation steps. Likewise, the data requirements for their ERR estimation include those listed for the four activities above, but relevant household, firm, and/or administrative data must be obtained for a sample that is informative for the entire area in which the reforms are expected to affect economic outcomes. Intervention and context specific data must also be obtained for the expected inputs and outputs of the reform investment. The analyst should work with the country team to identify each step in the reform

process at which there is a risk of partial or complete failure of or delay to the reform process and obtain as much information as possible to inform assignment of some probability to these outcomes for purpose of estimating the expected value of project benefits and costs (see MCC's PIR CBA Guidance).<sup>85</sup> For cases where land sector reform is likely to have substantial general equilibrium effects, additional data may be necessary to calibrate an appropriate model.<sup>86</sup>

## 2.6. Facilitation of Land Access and Land Allocation as Part of a Broader Contingent Investment

Lastly, investments that facilitate land access and allocation are often classified as LPR. These include, for example, investments that design and implement processes for land allocation as part of contingent irrigation, industrial zone, or other infrastructure development or improvement. Their primary benefit stream is that of the contingent investment and, in general, their costs should be included in the ERR of the contingent project. In some cases (for example, in the case of irrigation investments) the beneficiary stream of the contingent investment will be similar to that of a typical land investment (increases in land productivity or price), so that any benefits specific to the land investment would be infeasible to disentangle.

## 2.7. Investment Logic Models

Based on the above discussion, Figure 1 provides a compact high-level economic logic for LPR investments. For a useful comprehensive LPR investment logic, see Lisher (2018).<sup>87</sup> Figure 2 provides an example of a detailed program logic for a specific LPR investment, taken from MCC's Burkina Faso Rural Land Governance Project. MCC Economists must work with the Country Team to develop a detailed program logic for every investment. This example illustrates how many of the above activity types may be combined into a single investment program. The following section presents principles to guide the selection of existing data (and where necessary collection of original data), as well as the selection and application of methods to estimate the magnitude and distribution of LPR investment benefits and costs.

Table 1. LPR Investment Typology

ACTIVITY TYPE	BENEFITS	ESSENTIAL DATA	EXAMPLES

1. Clarification of Property Rights and Boundaries	Improved perception of tenure security leading to increased investment, land transfer and (in more limited cases) credit access	<ul style="list-style-type: none"> <li>• Land value (if functional land market); perceptions of tenure security; land conflict; investment and transfers; credit module</li> <li>• For rural areas, agricultural production module; non-farm enterprise and wage employment</li> <li>• Administrative data on number and cost of registrations, mappings, transfers, conflicts resolved, and mortgages</li> </ul>	<ul style="list-style-type: none"> <li>• Formal recognition of land use rights, mapping of parcel boundaries, and/or secure recording and public display of land use rights and parcel boundaries in a formal registry, cadaster or other public record.</li> <li>• Land conflict resolution</li> </ul>
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2. Building Capacity of Land Administration Institutions	Reduced cost of land administration service delivery, and/or improved service quality or uptake leading to improved tenure security and increased investment, land transfer and credit access	<ul style="list-style-type: none"> <li>• Administrative data on total number of registrations, mappings, transfers, and conflicts resolved per year, and their total fixed and variable costs (including user transport and opportunity costs)</li> <li>• Data required for activity type 1 above</li> <li>• User perception of service delivery and demand for land administration services</li> </ul>	<ul style="list-style-type: none"> <li>• Building capacity of national, regional and local land governance authorities (including traditional authorities and land boards, and the judiciary) through streamlining and strengthening institutions, operations, procedures and information technology</li> <li>• Staff Training</li> <li>• Development and installation of land information and transaction systems (including registry and cadastral databases)</li> <li>• Installation of geospatial mapping infrastructure</li> <li>• Streamlining of administrative procedures</li> <li>• Improvement</li> </ul>
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			<p>nt in ability of courts to process and resolve land conflict cases more predictably and speedily</p> <ul style="list-style-type: none"> <li>• Improved development and management of industrial land</li> </ul>
3. Increasing Awareness of Land Rights, Regulations and Administration Services	Increased registration, mapping, and transfer of parcels and use of conflict resolution services, leading to improved tenure security and increased investment, land transfer and credit access	<ul style="list-style-type: none"> <li>• Targeted individuals' exposure, understanding, and change in knowledge. Data for activity type 1 above.</li> <li>• Administrative Data: Costs and activities of public awareness campaign; number and cost of registrations, mappings and transfers.</li> </ul>	<ul style="list-style-type: none"> <li>• Public awareness and education campaigns to inform individuals of land laws/policies, rights and duties, and land administration services</li> <li>• Campaigns to encourage use of registration, mapping, transfer and conflict resolution services</li> </ul>

<p>4. Land Use Planning and Natural Resource Management</p>	<p>Reduced cost of non-land public service delivery; reduced negative externalities from colocation of incompatible uses and/or negative externalities from inappropriate uses</p>	<ul style="list-style-type: none"> <li>• Cost of service delivery in areas with and without improvements</li> <li>• Land value and/or agricultural productivity and their respective determinants; proximity to targeted incompatible/inappropriate uses</li> </ul>	<ul style="list-style-type: none"> <li>• Implementation of land use or natural resource management reforms</li> <li>• Urban planning</li> <li>• Land use classification</li> <li>• Land resource mapping</li> <li>• Community-based natural resource management</li> </ul>
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<p>5. Legal, Regulatory and Policy Dialogue and Reform</p>	<p>Benefits for direct activity types 1-4 above, with the added uncertainty of a causal link between expense on reform design, authorization and implementation and direct activity improvements.</p>	<ul style="list-style-type: none"> <li>• Data for activity types 1-4 above as applicable</li> <li>• Administrative data on the design, authorization and implementation of reforms</li> </ul>	<ul style="list-style-type: none"> <li>• Development of the legal, regulatory and policy foundations for land administration and land management</li> <li>• Establishment of new land administration authority or new court/judicial institution</li> <li>• Adapt regulations to better implement existing land laws</li> <li>• Creation or reform of standards for surveying, registration, valuation, land use planning, etc</li> <li>• Build capacity and awareness, of public officials responsible for designing, authorizing and implementing reforms</li> </ul>
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6. Facilitation of Land Access and Allocation as Part of a Broader Contingent Investment	Benefit streams of the contingent investment	<ul style="list-style-type: none"> <li>Administrative data on project costs; relevant data for contingent investment</li> </ul>	<ul style="list-style-type: none"> <li>Design and implementation of processes for land redistribution, for example as part of irrigation development or improvement projects.</li> </ul>
* The above include beneficiary specific interventions (e.g. interventions targeting a specific gender, or socially and ethnically marginalized populations)			

Figure 1: High-Level Economic Logic 88

Higher Real Incomes	
⊠	
<b>Increased Land Productivity/Value</b> <ul style="list-style-type: none"> <li>Increased Productive Firm and Household Investment</li> <li>Increased Efficiency of Land Allocation to Users and Uses</li> </ul>	<b>Cost Savings</b> <ul style="list-style-type: none"> <li>Direct Value of Lower Land Administration Service Costs</li> <li>Direct Value of Lower Municipal Service Costs</li> </ul>
⊠	
<ul style="list-style-type: none"> <li>Increased perception of tenure security</li> <li>Increased ability to securely buy and rent parcels</li> <li>Increased ability to collateralize parcels</li> <li>Improved ability to productivity and sustainably allocate, manage and tax land</li> </ul>	
⊠	
<ul style="list-style-type: none"> <li>Clarified property rights and boundaries</li> <li>Increased efficiency of land administration institutions</li> <li>Increased public awareness and use of land administration services</li> <li>Improved land use planning</li> <li>Improved legal, regulatory and institutional land governance framework</li> </ul>	

Figure 2: Example Program Logic for Burkina Faso Rural Land Governance Project

<b>Longer-term/Post-Compact Outcomes</b> (3-5 years-Phase 1: 2016/ Phase 2: 2017)	Increase Productivity from Existing Uses: Increased investment, incl. farm inputs, ag inputs (machinery & buildings) & land inputs (irrigation, terracing, drainage, fallowing and soil conservation) leading to higher output & productivity		
	Increase in Productive Investments by Households& Firms: Shift in land use patterns (higher value crops, shift to non-ag activities & cultivation expansion)		
	Improved Knowledge to Productively Allocate & Invest in Land: Improved access to land, land allocation and utilization		
<b>Shorter-term/End of Compact Outcomes</b> (1-2 years Phase 1: 2013; Phase 2: 2014)	Increase Ability to Realize Full Returns from Investment: A. Increase tenure security B. Avoid loss/damage of property C. Increase formal transactions	<u>Direct Savings</u>  1. Direct Value of Lower Transaction Cost: Improved access to land institutions (capital vs. village level); and 2. Direct Value of Lower Cost of Conflict: 1. Lower time and cost to resolve land conflicts; improved conflict mediation 2. Reduced risk and number of conflicts	
<b>Outputs</b>	<ul style="list-style-type: none"> <li>• Land cover map for Project communes</li> <li>• Land use plans for Phase 1 communes</li> <li>• Formalization of land rights for: Di Irrigated Perimeter (leases), Zone Aménagé, Ghanzourg ou and Project Communes (APFRs and community</li> </ul>	Establishment of local level institutions to provide land administration and conflict resolution services in project communes, staff training, and operationalization	National Assembly adoption of laws and decrees to improve rural land law (chartes foncières, SFRs, land registry, land info system, cadaster creation, immovable property rights, land title, land management rules and topographic standards)

	land)	Improved national, regional & provincial land administration: land registration and mapping capacity (CORS)	Local Legislation: Implementation of national laws and decrees in Project communes, including establishing operating standards for SFRs, CFV, CCFVs, adopting chartes foncieres and ensuring similar processes and documents for APFRs
<b>Activities</b>	Clarification and Formalization of Property: Land Registration and Titling	Strengthening of Land Administration Agency: Institutional Reform and Capacity Building	Legal, Regulatory and Policy Reform to Strengthen Property Rights and Enable Land Markets: Rural Land Law Development
Source: MCC country team staff			

### 3. Economic Analysis of Land Sector Investments

#### 3.1. Land CBA Process and Timing

Once the constraints analysis identifies LPR as a binding constraint, the MCC country team undertakes the root cause analysis. The LPR CBA thought process should begin at the same time – it is through this process that the analyst will form priors that inform the assumptions to include in the CBA model. The root cause analysis should clarify source(s) of costly or insecure access to land or other land-system related constraints and provide an economic logic for the definition and development of specific investments later in the compact cycle.

Throughout the process the analyst should seek to form a clear understanding of the counterfactual – the state of the world where both the benefits and costs of the components considered part of the MCC investment (including those financed by other parties) do not occur,<sup>89</sup> based firstly on the existing land governance system. To test how well existing customary or informal land management systems are functioning in a particular geographic area, for example, the team may examine land conflicts, inheritance practices, discrimination against women and other sub-groups, current land-specific investment levels,

use of land held/managed by chiefs or other local authorities, and perception of external threats to tenure security (e.g. government expropriation).<sup>90</sup> One reference to refer to early in compact development is the World Bank's Land Governance Assessment Framework (LGAF). If an LGAF does not exist for the compact country, one can be commissioned.<sup>91</sup>

The availability of LPR data and research varies widely by country, necessitating an idiosyncratic approach to root cause analysis, and often original data collection. A first step should be to obtain summary statistics from the national land registry/cadaster (if one exists), including coverage area of the registry and cadaster, and the number of registrations, mappings, building permits, transfers and mortgages administered in the past year. Any data on land conflict resolution should be obtained as well.<sup>92</sup>

If not produced for the CA, shadow price indicators that confirm a constraint may include high private expense on the resolution of land conflicts, if data are available, and high unmet investor demand for land (implying rationing). Cross-country Prindex data on perceptions of tenure security should be examined, if available for the country of interest. While analysts should be mindful of their limitations,<sup>93</sup> Doing Business data on the de jure fee, time and number of procedures required to transfer a commercial land parcel in an urban area are available for most countries, and may provide an initial indication. The Doing Business indicators now also include indexes summarizing geographic coverage (of the registry and cadaster), land conflict resolution (legal framework for immovable property registration and the accessibility of conflict resolution mechanisms), transparency of information (related to land administration), reliability of infrastructure (related to land administration), and equal access to property (by gender). The Doing Business Quality of Land administration index is calculated as the sum of scores for these five indexes.<sup>94</sup>

If available, micro data or publications that include descriptive or econometric analysis of agricultural production should be reviewed. Descriptive evidence of low levels of long-term investment (for instance, perennial and tree planting, soil conservation, fallowing, etc.), low adoption of new high-value crops, and removal of plots from agricultural production due to tenure uncertainty support a possible constraint in the land market. For urban areas, the gap between the cost to supply and price of built space may indicate the magnitude of distortions introduced by land use regulations. For areas covered by the formal land governance system, data on the extent of informal transactions (e.g. resulting from high transaction costs or lack of information) may provide insight on sustainability of the existing formal system in the counterfactual.

Where micro data is available or has been collected, additional tests can be performed using econometric techniques. A simple first step may be to estimate a production function and check for high variation in the marginal product of land. A well-functioning land market should facilitate efficiency-enhancing trades that limit this variation. The analyst may also check for a higher return to land-attached investments than moveable investments (such as livestock and machinery). In an environment with high tenure security, the return to land-attached and moveable investments should be equal.<sup>95</sup> A second step, if there is sufficient variation in tenure security in the data, would be to estimate the effect of this variation on levels of investment, output and profit per hectare. Where possible, appropriate estimation techniques should be used to limit identification concerns (see section 2 below). This analysis can be repeated differentiating effects by gender and social status to better understand the context.

Qualitative research or even anecdotes on land governance rights and their administration may also be useful. Evidence of practices that discriminate by gender or social status, efforts by individuals or firms to obtain land through illegal means, inefficient management of land by local authorities (including inappropriate leasing and sale of land), or unclear inheritance practices may indicate particular tenure insecurity sources. The World Bank's *Enabling the Business of Agriculture* (EBA) project provides general background on the rights of individuals and firms to register, use and transfer agricultural land and land administration procedures.<sup>96</sup>

In contexts for which a reliable land module is unavailable, the analyst should supplement available information with the collection of original data when possible, in close coordination with the team's M&E, land, and gender experts. If a survey is administered, it should at minimum collect data on land tenure type, land use type, perceptions of tenure security, incidence of land conflict, land investment, land transfers (sale/rental), physical land characteristics, demand for and use of land administration services, and (where a functional land market exists) land price and lease rates. For rural areas, an agricultural production module and non-farm enterprise and wage employment module should be administered. In some contexts, a credit module may be necessary as well. When there are multiple parcels managed across the household, it is advisable to administer questions to the parcel manager. In addition to survey data, the analyst should obtain administrative data from the implementing partner, including the number and cost of registrations, mappings, transfers, building permits and conflicts logged/reported and resolved.<sup>97</sup> It is recommended that information on land use rules be obtained as well.

Administering a demand module as part of a root cause analysis survey can help the country team to better understand the feasibility of potential projects and support the ERR estimation. If relevant to the constraints or interventions being proposed, the module should include existing demand and willingness to pay for first time land registration as well as the registration of subsequent transactions. This data is especially informative in regions with differing levels of land regularization. Information on respondents' legal knowledge should be collected as well. Administering these questions separately to men and women can facilitate identification of gender-specific constraints. The module provides important information on the distributional impact of potential LPR investments and can help to identify areas where policy action will have the most significant and/or immediate impact, as well as sequencing and prioritization of policy interventions.

The World Bank is collaborating with MCC, USAID and others to develop a standard module for application across contexts. The final module was not available at the time of writing, but Annex II recommends sections for inclusion in a root cause analysis land tenure module (based on [Holden, Ali, Deininger and Hilhorst 2016](#)) that can be adapted to the local context and available information on potential sources of insecurity. Land modules administered by previous MCC compacts are also available in MCC's Data Catalogue ([data.mcc.gov](http://data.mcc.gov)).<sup>98</sup> Lastly, USAID has sample instruments available for download at [www.land-links.org](http://www.land-links.org).

The analyst should also consider contextual factors on which the economic rationale for intervention depends. If the main problem is low agricultural investment due to tenure insecurity, are there complementary input and output markets that would facilitate investment if the constraint were released? If it is believed that a LPR intervention would relieve a credit constraint, it is particularly important to

check that sufficient legal and financial systems exist to support use of land parcels as collateral for loans to target beneficiaries, especially where these beneficiaries are low-income and parcels are small and/or located in remote areas.<sup>99</sup>

## 3.2. Quantifying Benefits

LPR benefits are typically measured collectively in terms of mean differences in the productivity or price of land parcels with and without the project. The analyst should take care not to double count benefits from LPR projects by incorporating both measurements of land price and land productivity into the ERR. Since all future income streams from an asset should be reflected in its price (Rosen 1974), this would double count project benefits. Likewise, the analyst should not include both general land productivity effects and land productivity effects occurring specifically through a reduction in land conflicts, which would also result in double counting. Benefits/losses from parcels brought into/out of production as a result of a LPR project, however, should be included in the ERR along with gains in productivity on parcels cultivated both with and without the project.<sup>100</sup>

If an ex-post change in land price or productivity is expected to occur through an induced private or public investment, it is important to either adjust the expected change in land price or productivity for these costs, or to include them in the ERR. This is particularly important for industrial zone or urban land projects. For example, a LPR intervention that removes building height restrictions must subtract the cost of supplying additional floors of built space from the expected ex-post change in land value. Likewise, a LPR intervention that creates a new industrial zone must subtract the cost of expected private investments in and public service delivery to the zone from the expected ex-post change in land value. The analyst should assume that induced investment capital and labor is applied to its next best alternative use in the counterfactual. This would apply also to modeling interventions that accelerate the pace of an investment (through reduced administrative process times) or induce investment through increased credit access. Because MCC generally applies an evaluation period of 20 years, changes in price should also be converted to equivalent annual payments to avoid overstating benefits. The equivalent annual payment is easily calculated by multiplying the change in price by MCC's assumed discount rate (10%).<sup>101</sup>

As discussed in Section I, the balance of empirical evidence suggests credit effects should be excluded from ex-ante CBA of LPR investments except where compelling contextual evidence supports a credit effect. Benefits from credit access induced land investment are largely reflected in land value (or productivity) in any cases so that their separate inclusion would double count. In rare cases where the primary impact of a LPR project is expected to occur through the credit channel, or the expected induced investment would not be reflected in land value or productivity, the benefits can be measured as the sum of the loan recipients' profit from the induced investment (subtracting the lending rate) and the lender's profit on the loans (subtracting the bank's cost of capital and intermediation). The analyst should assume that both loan recipient and lender labor and capital applied to execute the induced investment in the "with project" scenario are applied to their next best alternative use in the counterfactual. The analyst should also include the full cost of operation, repair and maintenance of any induced capital investment. Lastly, the analyst should consider what share of the loans are likely to be applied towards consumption smoothing.<sup>102</sup>

Subjective land prices should be selected as an outcome indicator only in contexts where there is a well-functioning sales market, so that individuals have reasonable awareness of land values. Appropriate survey methods are necessary to minimize subjective bias in the reporting of sale rates.<sup>103</sup> Agricultural productivity is the preferred outcome indicator for rural areas where most land is agricultural and sales may be more uncommon. Land price data may be more useful in urban areas where sales are more common. Regardless of setting, data on land-attached investment should be closely tracked. Rental data should be used only with attention to context – in some settings rental rates may reduce as tenure security improvements ensure owners that rented-out property will not be expropriated.

### 3.3. Estimation Methods

This section briefly reviews methods for the estimation of LPR project benefits. MCC economists commonly parametrize ERR models using project benefit estimates from other contexts. This may lead to under or overestimation of program impact due to differences between the compact country context of interest and the context from which the parameters are drawn. Another concern is that, where many relevant studies exist and a systematic review or meta-analysis is unavailable, it is unclear which studies the parameters should be drawn from, creating another potential bias.

Where feasible, it is preferable for the analyst to estimate project benefits within the compact country context of interest. In particular, the analyst can estimate the change in land price or land productivity that would result from the expected improvement in tenure security. Whether this is appropriate will depend on the quality of available data and the availability of relevant systematic reviews or rigorous evidence from a similar context. In the discussion below, we summarize both estimation methods and potential threats to econometric identification of which the analyst should be aware.

#### 3.3.1. Hedonic Land Price Regressions

While many investigators apply hedonic land price regressions to evaluate the economic impact of land titling (or improvements in tenure security), this approach should be applied with caution, particularly where the land value is subjectively reported. First, if there is no land market in the area, the price of land may be unknown.<sup>104</sup> For this reason, hedonic land price regressions should never be applied in contexts without a well-functioning land market. Second, even where a well-functioning market exists, the land price is often collected using hypothetical or perception based questions that are noisy and suffer from subjective bias. Respondents may also have incentive (or believe they have incentive) to game their response to receive a better potential sale price or, alternatively, to avoid a potential tax.<sup>105</sup>

For these reasons, land investment and productivity measures are preferred for rural areas. For urban areas, subjective price data may be more reliable, and productivity more challenging to estimate. One drawback of land productivity indicators is that they may not fully reflect gains from diversification into non-farm activities by less agriculturally productive households. Likewise, increases in the productivity of land leased-out by households as a result of LPR reform may not be fully observable within evaluation survey data. For cases where a credit effect is observed, gains from investment in non-farm activities resulting from increased credit access would also not be reflected in land productivity. Household income

(measured through household consumption) is therefore the preferred outcome indicator for estimation of medium to long-term effects, if available.

### 3.3.2. General LPR Estimation Concerns

First, the decision to title a parcel is (econometrically) endogenous to unobserved characteristics of the parcel as well as prior investment in that parcel (e.g. existing infrastructure). Yet, the relevant impact of titling on land price (or productivity) is meant to come through these investments, so that controlling for them will result in underestimation of the effect of titling. Deininger and Chamorro (2004), for instance, find that the estimated effect of titling on price decreases substantially with the introduction of household fixed effects to control for unobserved fixed parcel characteristics (6.1% to 2.3%), implying that the correlation between price and title in the hedonic regression is mostly spurious. Second, there is potential reverse causality, since an individual's investment in a property may cause that individual's rights to be recognized.

Both of these effects will lead a cross-sectional hedonic land price or yield regression to overstate the benefits of improved tenure security. Controlling for unobserved heterogeneity requires special econometric methods for which appropriate data may not be available, while controlling for investment in the parcel in a cross sectional estimation could drastically understate the effect of improved tenure security, which presumably would occur in large part through increased land-specific investment.

For these reasons, we recommend use of data from an informative context including at least two periods over which there is variation in titling so that a household fixed effects (first differences) estimator can be used to account for unobserved, fixed heterogeneity in household and land characteristics. If a LPR reform is driving tenure security variation in the data from that context, it is preferable that the reform had been introduced systematically to areas (rather than voluntarily adopted), so that parallel trends would be more likely to hold (otherwise time-variant factors in the idiosyncratic error term may be driving productivity differences).<sup>106</sup>

At a minimum, regressions should control for characteristics of the right holder(s)<sup>107</sup> (assets, education, gender, years residence in community, number of parcels, access to credit<sup>108</sup>); fixed parcel characteristics (cropped area or land size, land quality, topography and distance from community and nearest city center, years of claim to/use of parcel, land use (if non-agricultural parcels included)), and community characteristics.

### 3.3.3. Example Empirical Models

One simple model applied by Linkow (2016) to estimate the impact of MCC LPR reform in Burkina Faso is the following:

$$Y_{piht} = \beta X_{piht} + \gamma V_{piht} + W_{iht} + Z_{ht} + \lambda_l + \varphi_t + \varepsilon_{piht} \quad (1)$$

Where  $Y_{piht}$  is the log of agricultural output per hectare for parcel  $p$  managed by cultivator  $i$  in household  $h$  for time period  $t$ .  $X_{piht}$  is a vector of plot-specific tenure security measures;  $V_{piht}$  is a vector of parcel characteristics (cultivated area, length of tenure, whether the household resides on the parcel, land quality,



and whether the plot is rented);  $W_{iht}$  is a vector of cultivator characteristics (gender, age, literacy, credit access);  $Z_{ht}$  is a vector of household characteristics (size, non-agricultural income, livestock);  $\lambda_i$  is a household or location fixed effect (depending on data availability),  $\phi_t$  is a year or season fixed effect, and  $\epsilon_{iht}$  is the error term.

The productivity loss from tenure insecurity can then be estimated as the sum of the products between each (statistically significant) tenure security dummy coefficient and the incidence of that type of insecurity.

A robustness check can be implemented using an instrumental variable estimation. Linkow (2016) implements this by first constructing a single index of perceived insecurity by taking a weighted sum of the tenure insecurity indicators, using their coefficients from the above specification as the weights. Instruments can include past conflict incidence, a dummy for parents of household head born in the village, or other appropriate variables.<sup>109</sup> In cases where variation in perceived tenure security in the data is believed to have occurred recently, it is acceptable to implement a similar procedure using investment as the dependent variable rather than productivity, and to then convert this estimate to income according to the long-run change in productivity associated with these investments. This can be implemented through a series of logit or probit estimators with the relevant investment in the dependent variable. Returns to investment can then be estimated using a yield function, preferably with household fixed effects.

The above applies to ex ante ERR estimation using available micro data with variation in indicators of tenure security. For closeout ERR estimation, changes in household income and land productivity from LPR activities are unlikely to have had a sufficient effect period to materialize, but post-evaluation ERRs would incorporate the estimated impacts using whatever empirical method was applied for the IE. While changes in investment, land transfer, and credit access may be detectable, any early closeout results from mid-line surveys should be interpreted with caution and attention to context. Activities that clarify rights to and boundaries of parcels may actually reduce perceptions of tenure security and increase conflicts over the short-run as individuals attempt to establish claims in the clarified record. This may lead to a temporary reduction in investment and rental activity. In projecting LPR benefits ex ante, analysts should take account of the required effect period between implementation and benefits. Economic benefits are unlikely to accrue until several years after implementation.

### Box 1: Hedonic Price Regression

Switching the dependent variable in equation (1) to value of land per hectare would result in a hedonic price regression that could be similarly applied to estimate the value lost from tenure insecurity.

Hedonic price regression are also frequently applied to estimate the value of other amenities expected to be lost or created by land use regulations, particularly in urban areas. Glaeser, Gyourko and Saks (2005) estimate the magnitude of negative new construction externalities in Manhattan to determine whether large effective regulatory taxes on new construction are justified. The analysis shows that the price of a Manhattan high rise floor is typically more than twice its supply cost, and present evidence that height restrictions are the primary cause of this gap. They apply hedonic price regression to estimate the value of views destroyed by new construction (one component of the negative externalities examined). In particular, they estimate the following:

$$Y_{cbt} = \beta S_{cbt} + \gamma L_{cbt} + M_{cbt} + H_{cbt} + \lambda_b + \varphi_t + \varepsilon_{cbt}$$

Where  $Y_{cbt}$  is the log price of condominium unit  $c$  in building  $b$  sold in year  $t$ ,  $S_{cbt}$  is the unit's log square footage,  $L_{cbt}$  is a dummy for whether the unit is located on floors 11-20,  $M_{cbt}$  is a dummy for whether the unit is located on floors 21-30,  $H_{cbt}$  is a dummy for whether the unit is located on floor 31 or higher,  $\varphi_t$  is a year of sale fixed effect, and  $\lambda_b$  is a building fixed effect. The coefficient on  $H$  (.23) was applied in the analysis as an upper bound estimate of the value of a view (a unit value increase of roughly 25%). This reflects the difference in sale price between a unit on the bottom 10 floors and a unit on floors 31 and above (the estimate is an upper bound, since the square footage term does not fully control for greater unit quality on the higher floors). Based on this, they conclude that the negative new construction externality of lost views justifies a construction related regulatory tax equal to only 12.5% of apartment values in this context.

### 3.4. Costs to Include in the CBA

All economic costs incurred to implement the intervention, whether incurred by MCC or another party, should be included in the economic analysis. All expenses incurred by beneficiary households as a result of the intervention (i.e. certification and registration costs, including travel cost and time) should be included as well. Project costs are normally provided by Department of Compact Operations land leads. Typically land project costs will include the cost of the policy reform undertaken, any physical infrastructure built to support the land tenure system, program administration and oversight, and M&E. As mentioned above, if changes in ex-post land price or productivity are expected to occur through an induced private or public investment, it is important to either adjust the expected change in land price or productivity for these costs, or to include them in the ERR.

In estimating the cost of LPR projects, the analyst must also include any increase in the maintenance cost of land administration systems resulting from the intervention that are necessary to insure sustainability of the benefits. For instance, the persistence of tenure security gains from expansion of a registry to cover

100 new communities will depend in part on sufficient systems and capable staff to register future land transfers in these communities, as well as demand for these services from land holders. Likewise, the sustainability of improvements to the efficiency of land administration systems or reforms to land institutions and policies will depend on continued expenditure to support them following compact close that would not have occurred without the project.

### 3.5. Special CBA Topics

#### 3.5.1. Policy and Institutional Reform (PIR)

In conducting CBA of LPR PIR investments, analysts should follow MCC's PIR CBA Guidance.<sup>110</sup> Figure 3 (from that guidance), depicts the conceptual distinction between PIR and non-PIR investment components. In particular, activities falling in area 4a or 4b (reform to laws, regulations, government priorities and budget allocation; and reform to sector governance institutions), as well as activities falling in area 3 or 2 are considered PIR interventions. These correspond roughly to activity type 5 (and in some cases types 2 and 4) in the LPR investment typology above. Likewise, activities falling under areas 5 and 6 in the figure below are considered non-PIR interventions. These correspond roughly to activity types 1, 2, 3 and 4 in the LPR investment typology above.

Figure 3: Simple Model of Economic Policies and Institutions

Economic Outcomes	
(6) Policy outputs ( <i>quality and reach of infrastructure and public services, human capital, macro and micro conditions for economic activity</i> )	
(5) Inputs ( <i>infrastructure, land titles, trained teachers, judicial tracking systems, etc.</i> )	
(4a) <b>Sector Policies</b> ( <i>laws, regulations, government priorities, financial allocations</i> )	(4b) <b>Institutions</b> of sector governance that <i>implement or mediate</i> the implementation of policies
(3) Policy-making institutions (organizations, stakeholder interest groups, government policy making bodies, formal and informal rules of interaction)	
(2) Political and legal system of national, regional, and local governance arrangements.	
(1) History, culture, geography and natural endowments	

Source: MCC PIR CBA Guidance

MCC's PIR CBA Paper guides analysts that "to provide more consistent treatment of potential investments and in keeping with EA's existing guidelines, economists will conduct and report the results of CBA on tangible/non-PIR investments, PIR, and other related (sub-) activities separately to the extent

that each has a separable program logic linking inputs to benefit streams.” Separability is determined by the extent to which various elements of a project are required in combination (e.g., transmission, distribution, and generation) to produce identified benefit streams. At the same time, “because there are often complementarities (where total benefits exceed the sum of the parts) between PIR and other activities, [analysts] will also report the result of a combined analysis. In cases where PIR elements are strictly necessary for achieving benefits from non-PIR elements – such as may be the case to render land titles valuable, schools operational, or credit support economically efficient, for example – or the complementarities are similarly high, only a combined analysis may be required.”<sup>111</sup>

For most LPR investments, there will be large complementarities between the PIR and non-PIR components such that they will need to be modelled together. Following MCC’s PIR guidance, however, in cases where the non-PIR benefit streams are not strictly dependent on the PIR component, the PIR and non-PIR components should also be modelled separately.<sup>112</sup> This will help the team to ensure that all investment benefits are appropriately incorporated, that each investment component is justified by its return, and that components are appropriately prioritized for selection during development and support during implementation. In modelling the CBA of PIR components, the analyst should take care to include expected benefits for the entire area affected by the PIR components, rather than expected benefits only for areas also affected by non-PIR components.

The analyst should also work carefully with the country team to identify each step in the foreseen design, approval and implementation process where there is a substantial risk that the desired LPR PIR reforms are poorly designed, and/or delayed or not approved and assign some probability to these outcomes, both for purpose of accurately forecasting the expected investment ERR and running scenarios to demonstrate sensitivity of the ERR to success or failure of the PIR activities. This will help to focus MCC and counterpart attention on critical PIR components during design and implementation.

### **3.5.2. Measuring Benefits through Consumer Surplus**

While calculating economic benefits as expected changes in welfare (as measured by the sum of consumer and producer surplus) is standard CBA practice, MCC’s CBA guidelines specify that changes in real income proxies (e.g. value added) should be used instead where possible. In some cases, however, consumer surplus (CS) methods may be the best tool available to approximate real income changes.

One concern with the application of consumer surplus methods at MCC is that willingness to pay (WTP) is sometimes measured through stated preference, rather than revealed preference. Measurement of WTP through stated preference for LPR investments is particularly concerning in areas where respondents have had limited exposure to the land administration services whose value they are being asked to assess. Another common concern with the application of stated preference for LPR investments is that the household’s stated WTP may differ by household member as a result of failure of the unitary household model. For example, male household heads may stand to lose bargaining power within the household as a result of a land formalization investment that strengthens the rights of women cultivators in the household relative to male cultivators versus an existing, customary system.

Stated preference surveys may be a very useful tool for diagnosing the root cause of LPR related binding

constraints and for identifying the types of LPR investments that are most likely to be effective and the areas they are most likely to be effective in.<sup>113</sup> For purpose of estimating CBA benefit stream magnitudes, however, revealed preference should be used where possible. Stated preference should be applied only in contexts where there is a compelling case that these measurements are accurate and that revealed preference methods are infeasible or unreliable.

A second concern regarding application of CS methods at MCC has been that it may incorporate welfare gains that are excluded from the national accounts. This is less of a concern for LPR investments, since the primary benefit stream is generally change in value added per hectare or change in the value of land per hectare (equal to the PV of the expected change in future value added). For urban LPR investments, note that changes in the value of houses and apartments enter the national account through either the owners' imputed rent (for owner occupied apartments), or the actual rent paid (if rented out). Negative and positive externalities resulting from LPR projects (e.g. blocked views from increased housing development or increased access to green spaces) are also reflected to a large extent in ex-post land values. Ex-ante, the magnitude of these externalities are often estimated using hedonic price regression (see for instance Glaeser, Gyourko and Saks 2005 for blocked views). Nonetheless, there may be benefits/externalities not reflected in land values. If there are cases where these are believed to be particularly large, they can be considered on a case by case basis.

A third concern regarding the application of CS methods is that they require modelling of a demand curve using limited empirical basis. For cases where the investment is suspected to reduce the price of, increase the quality of or increase access to a good in a way that substantially increases its consumption, inaccurately modeling the demand curve can substantially alter the estimated welfare impact.<sup>114</sup> For many LPR investments, the bulk of benefits can be modelled as an improvement in land quality that shifts the demand curve outward and increases WTP for land already in use where supply of land is relatively inelastic (so that few benefits result from increased land consumption). For cases where a LPR investment increases the availability of a particular type of land (e.g. urban formal land or industrial zone expansion), modelling the demand curve will be necessary in cases where the increase in provision of land is sufficient to have an overall effect on the market for that land type. Likewise, if urban land regulations are sufficiently altered, general equilibrium effects may be important and must be incorporated into the analysis (for instance through application of a monocentric city model, etc).

### 3.5.3. Uncertainty

MCC's CBA guidelines require economists to input key CBA model parameters into a Monte Carlo simulation to analyze the risk of potential investments. Since increasing the number of parameter inputs to the Monte Carlo simulation arbitrarily widens the resulting distribution of trials (suggesting increased uncertainty), the credibility of Monte Carlo simulation as a risk analysis tool requires some consistency in the parameters input by economists across investments. Due to wide variation in LPR investment types, parameters subject to substantial uncertainty and to which the ERR is sensitive will necessarily vary to some degree across investments. However, the following are parameters typically included in Monte Carlo simulation:

#### Clarification of rights and/or boundaries/improved conflict resolution

- Land area for which rights and/or boundaries are clarified or conflicts resolved
- Expected change in land value/value added per acre/hectare
- Expected increase in land under production

### Conflicts

- Number or percentage of parcels with conflicts without the investment
- Annual growth rate of conflict incidence without the investment
- Average cost of property damage or loss per conflict
- Resolution cost per conflict
- Percentage decrease in conflicts attributable to MCC investment

### Land Service Cost Reduction

- Number of parcels registered/mapped, transferred, etc per annum
- Reduction in administrative/user/other cost of parcel registration/mapping; transfer, etc
- Incremental long-run cost of sustaining improved policies, institutions and services
- Elasticity of registrations/transfers with respect to administrative and user costs (if price effect assumed)

### PIR

- For each step in the foreseen PIR design, approval and implementation process where there is a substantial risk that the desired reforms are poorly designed, and/or delayed or not approved, the probability assigned to each of these outcomes.

In all cases, economists should discuss the level of uncertainty surrounding reported ERRs in the Investment Memo as well as the key sensitivity factors. Because the evidence base is continually growing, evidence of impacts in similar contexts will often be available (i.e., the evidence documented in this guidance). Still, depending on the level of uncertainty as regards the degree of success of PIR interventions, economists may opt to report the ERR of expected net benefit streams, a central range (25<sup>th</sup>-75<sup>th</sup> percentile), the probability of surpassing the hurdle rate and/or other summary statistics approved by Economic Analysis Division management.

### 3.5.4. Beneficiary Analysis

In accordance with MCC's Guidelines for Beneficiary Analysis, the number of beneficiaries and mean investment benefits per beneficiary should be estimated and reported by the World Bank's poverty categories. The first qualified class of "extreme poor" has a daily per capita expenditure of less than \$1.25 using US\$ 2005 PPP, or \$1.90 using US\$ 2011 PPP. The second group of poverty called "poor" consists of individuals whose daily expenditure is between this and \$2 (2005 PPP) OR \$3.10 (2011 PPP). The third group of poverty called "near poor" is comprised of individuals with a daily expenditure of up to \$4 (2005 PPP). The last poverty group called "Not poor" consists of individuals whose daily expenditure exceeds \$4 (2005 PPP).

As specified in MCC's Guidelines for Beneficiary Analysis, beneficiaries include those people who experience better standards of living as a result of the project through higher real incomes. MCC defines and counts as beneficiaries all members of households that have at least one individual who realizes income gains. For LPR investments, beneficiaries would therefore typically include all members of households experiencing increased income (e.g. as proxied by increased land value or agricultural income) or reduced land service costs (e.g. parcel registration costs) as a result of MCC's investment.

In practice, MCC's LPR CBA models have typically excluded beneficiary analysis. For example, the Benin I, Burkina Faso I, Ghana I and Lesotho I closeout and original CBA models excluded beneficiary analysis, as did the Madagascar, Mongolia I, Morocco I, Namibia and Nicaragua original CBA models (the closeout model is not yet available for the later cases). While the original Mozambique CBA model does not include beneficiary analysis, the closeout Mozambique CBA model does. The approach taken here was to estimate the number beneficiaries by poverty category using household survey data and to assume each beneficiary household received an equal share of the present value of the investment's total benefits regardless of poverty category.

For LPR investments, it is generally preferable to instead separately estimate benefits per beneficiary for each poverty category. On the one hand, LPR investment benefits tend to be proportional to the size of household land holdings, and lower income households tend to have smaller land holdings. On the other hand, LPR investment benefits may also be proportional to the degree of tenure insecurity at baseline, and lower income households are more likely to have low tenure security at baseline. That is, the poor may have more to gain from LPR reform, since informal rights tend to be weaker for those low in the political hierarchy, which disproportionately includes women and the poor.<sup>115</sup>

For these reasons, where possible effects on land value and agricultural income should be estimated using separate samples or calculated using predicted values taken from specifications including interactions between the tenure security indicator(s) and poverty categories (and any other important poverty category interactions). These effects can then be multiplied by the mean affected land area per household for each poverty group to find the distribution of investment benefits.

For benefits from land service cost reduction, the expected number of registrations/transfers/conflict resolutions and number of households participating in these transactions should be separately forecast by poverty category where possible. For cases where the administrative cost is a percentage of land value, the savings per transaction will also vary by subgroup and should be separately calculated. Likewise, the expected user cost reduction (e.g. travel time and vehicle operating cost reduction) may also differ by poverty category and should be separately estimated where possible.

Since the benefits of LPR projects are also likely to differ substantially by gender of the primary cultivator or user of affected parcels, it is also recommended that the number of beneficiaries and benefits per beneficiary be estimated and reported by gender category on the beneficiary analysis tab. Where data disaggregated by gender of the primary cultivator or user of the parcel is unavailable, beneficiary analysis can instead be performed by gender of household head. See MCC's Beneficiary Analysis Guidelines for additional information.

### 3.6. Areas for Further Work

Despite a vast extant literature on LPR investment effects, MCC's preliminary gap mapping analysis<sup>116</sup> and IFAD's 2017 systematic review<sup>117</sup> identify substantial evidence gaps. With regard to interventions assessed, many studies investigate effects of land titling interventions, but few focus specifically on institutional strengthening, legislative and regulatory reform, public awareness campaigns and land use planning (particularly in urban lower and lower-middle income country contexts). With regard to outcomes, few studies assess effects on land transfers, land administration cost savings, and municipal service cost reduction. Greater attention is also warranted to key intermediate outcomes such as perception of tenure security and changes in awareness/knowledge of land laws and institutions.

There are also few studies designed to test for long-term impacts despite the long-term effect periods of key LPR outcomes such as agricultural productivity and household income. Likewise, few studies investigate the ramp-up of LPR investment effects over time. Finally, few studies investigate big-picture questions such as the effect of LPR investments on economic growth. While most existing studies rely on household data, addressing some of these questions will require greater use of administrative and remote sensing data in combination with innovative methodologies.

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## 5. Annex I MCC LPR Investments

MCC has invested approximately \$500 million in LPR, and included LPR investments in 15 of 33 compacts and three of 25 threshold programs. This annex describes MCC's investments in Benin, Nicaragua, Lesotho, and Namibia to illustrate past variation in LPR investments' objective, scope and CBA approach; and briefly discusses variation in past CBA practice outside these case studies. See the PIR section above for additional discussion of the Burkina Faso Rural Land Governance project and CBA approaches to PIR.

Stand-Alone LPR Projects		LPR Investments Part of Larger Projects		Threshold Program LPR Investments	
Benin	\$30.9 million	Ghana	\$4.2 million	Liberia	\$7.1 million
Burkina Faso	\$58.3 million	Indonesia	\$43.0 million	Zambia	\$3.6 million
Cabo Verde II	\$17.3 million	Lesotho	\$21.0 million	Togo	\$8.0 million
Madagascar	\$29.6 million	Mali	\$0.9 million		
Mongolia	\$28.5 million	Namibia	\$23.1 million		

Stand-Alone LPR Projects		LPR Investments Part of Larger Projects		Threshold Program LPR Investments	
Morocco	\$172.0 million	Niger	\$9.8 million		
Mozambique	\$39.5 million	Senegal I	\$4.9 million		
Nicaragua	\$7.2 million				

Source: Millennium Challenge Corporation

## 5.1. Variation in Objective, Scope and CBA Approach

### Benin

MCC invested \$31 million to improve the efficiency of land administration services and to improve land tenure security and access to land in Benin. In particular, the investment was designed to support (1) formation of land policy and legislation; (2) issuance of written records of both urban and rural land rights; (3) improvement of land records management and information services; and (4) promotion of citizen awareness and knowledge of land policy. The Original CBA Model benefit streams were reduction in land parcel registration cost, increase in urban land value, and increase in rural land agricultural income. The [Closeout CBA Model](#) benefit streams were increase in urban land value and increase in rural land agricultural income; reduction in land parcel registration cost was excluded. The closeout model assumes an increase in urban land value of 15% and an increase in rural land agricultural productivity of 6%. The source for these estimates, however, is not clearly documented in the Closeout CBA Model. Follow-up with the MCC economist found that the estimated urban land value increase was based on due diligence mission interviews and consultations with government and other stakeholders. The agricultural income increase was based off the estimates of Jacoby and Minten (2007) for Madagascar.

### Nicaragua

MCC planned to invest \$26.5 million to increase tenure security and access to land, and to improve natural resource management and land use planning in Nicaragua. In particular, the investment was designed to (1) provide technical support to government institutions to implement and sustain tenure regularization reforms in León; (2) perform cadastral mapping to obtain current property descriptions to be recorded in a geographic information system in León; (3) clarify and formally document property rights and resolve conflicts; (4) link municipal and national registry and cadastral databases by installing the Integrated System of Cadastral and Registration Information (SIICAR) in León; (5) demarcate and legally validate the boundaries of four environmentally-sensitive protected areas, regularize land rights within the perimeter of each, and facilitate the adoption of land use management plans by occupants therein; (6) fund technical assistance, workshops and research to develop technical and policy measures to promote participation in the Project and sustainability of its results. MCC spent \$7.2 million on this investment before the compact was terminated due to government actions inconsistent with MCC eligibility criteria.

The [Original CBA Model](#) benefit streams were increase in land value and reduction in land transaction cost. The model assumed each parcel was transferred twice over a ten year evaluation period (in the fifth and tenth year). Land values were assumed to increase at a linear rate sufficient to achieve a 22% increase by year 10. The model cites two sources for the forecast property value increase: The estimate of Deininger and Chamorro (1994) that receipt of registered titles in rural areas of Nicaragua increased land values by 30%, and the estimate of a 2004 World Bank Project Appraisal Document (PAD) that property registration in Honduras would increase land values by 14.56%. In the latter case, it is unclear which PAD estimate was applied (or if a weighted average was used), since the PAD estimates the potential increase separately for high and low value urban and rural parcels.

## Lesotho

MCC invested \$17.9 million in Lesotho to provide technical assistance to revise land tenure reform legislation and policy, and to support the implementation of a land regularization program (titling) for urban and peri-urban areas.<sup>118</sup> In particular, the land administration reform activity was designed to (1) Support revision to the Government of Lesotho's land policy and a redrafting and implementation of its land bill; (2) regularize rights to land in informal urban settlements; (3) modernize and improve land administration services; and (4) conduct public outreach and training to deliver information on the benefits of formalization and the process for formalizing land; and train land administration staff, local governments, and traditional authorities on land administration services and land allocation.

The [Closeout CBA Model](#) benefit stream was incremental value added resulting from increased use of credit associated with greater mortgage activity. The model assumed a fixed 17% return on incremental mortgage lending, based on bank data suggesting a real lending rate of 12% and an uncited assumption that the return above the lending rate for microenterprise investments not in default was 5%. Based on bank data, a loan default rate of 2% and average return on investment for defaulting loans of 6% were also assumed. The model then forecast the difference in the amount of mortgage lending with and without the project. The team also considered including reduced transaction costs resulting from decreased time necessary to research and navigate the registry system, but ultimately excluded this benefit stream due to lack of a credible data source for the magnitude of the benefit.

## Namibia

MCC invested \$23 million in Land Access and Management and Livestock Support as part of the Agriculture Sector Project in Namibia. The Land Access and Management and Livestock Support activities were combined in a single [CBA model](#). The main objectives of the Communal Land Support activity were to empower residents and landholders at the village/local level to actively and effectively participate in the use and management of their land resources in the Northern Communal Areas; and to improve the administration and management of communal lands.<sup>119</sup> In particular, the activity was designed to (1) mobilize local communities through outreach, public education and training; (2) support the establishment and operation of village committees through which local communities could exercise their land rights; (3) identify and secure rights to the commonage, eventually leading to the registration of the commonage in the name of a group in a certain number of pilot areas; (4) improve the policies, procedures, manuals and forms that will; (5) Train and orient Traditional Authorities, CLBs and MLR

staff on improved policies, procedures, manuals and forms; (6) Support broad dialogue on land-related issues; (7) identify and map village boundaries (or locally appropriate equivalents); and (8) identify and secure individual customary and leasehold rights through registration. The CBA model benefit streams for the Land Access and Management and Livestock Support activities were efficiency gains in marketing and transport; reduced losses due to quarantine; and reduced losses due to severe drought.

## 5.2. Variation in CBA Approaches

For most other rural LPR investments, the primary benefit stream was increased agricultural (or livestock) productivity. For example, both the [Burkina Faso](#) and [Ghana](#) models forecast increased agricultural productivity resulting from the project (although, in the latter cases, the productivity gains from the land activity could not be disentangled from those of complementary farmer based organization (FBO), irrigation development, and credit services activities).

The CBA approach for urban and peri-urban LPR projects, however, has varied. For some investments, the primary benefit stream was increased land value (e.g. [Mozambique](#)). For other investments, the primary benefit was incremental value added from private investment resulting from increased use of mortgage lending to access credit. As noted above, the Lesotho CBA model assumed a fixed 17% return on mortgage lending and forecast incremental mortgage lending resulting from the project. A similar approach was applied for the [Mongolia](#) Property Rights Project, although the return on mortgage lending was estimated at 35% based on bank records. In particular, the model applied the unweighted average of the mean lending rate offered by two banks to residents of the investment activity area. A default rate of 5.5% was applied based on an IMF report.<sup>120</sup> A return above the lending rate to microfinance enterprises not in default of 5%, and a return on loans in default of 12.1% were assumed without any citation.

Most CBA models have excluded benefit streams that account for improvements in the efficiency of land administration systems. For example, the Burkina Faso model excluded benefits from the reduced administrative cost of land conflict resolution due to the low magnitude of these benefits relative to benefits from increased agricultural productivity. Likewise, the Mozambique model excluded benefits from the reduction of administrative and time cost to obtain a DUAT (formal land use certificate).<sup>121</sup> For Ghana, the model excluded reduced user time cost due to difficulty projecting demand for land administration services.

A more unusual approach was applied for [Cabo Verde](#), where increases in tourism sector property investment were forecast to result from improved tenure security and reduced transaction costs in targeted island areas. The team planned to model the change in tourism wages and profits resulting from this increased investment, if feasible. Since the evaluation is ongoing, detailed information regarding the benefit streams is not yet available.

## 6. Annex II Land Tenure Demand Survey

<sup>122</sup>

This annex recommends sections for inclusion in a land tenure module to be conducted during the root

cause analysis. These recommendations are taken directly from [Holden, Ali, Deininger and Hilhorst \(2016\)](#), who propose a Standard Land Tenure Module for inclusion in multi-purpose household surveys. Inclusion of these sections ensures that the most essential information on land tenure is covered, including: (i) ownership and use of agricultural and non-agricultural land and immobile assets on the land, (ii) sources of land acquisition including inheritance, (iii) land transactions, (iv) formal and informal property rights, (v) investments on the land, (vi) land conflicts, (vii) legal knowledge, (viii) gender and property rights, (ix) perceptions of tenure security and (x) trust in land-related institutions.

While these sections are recommended, the exact sections and questions included in MCC root cause analysis land tenure modules should depend on country context, results from the constraints analysis and early root cause analysis, and available resources. Note that questionnaires should be designed in close coordination with the M&E, land and GSI country team leads; these team members *must* review all survey instruments before they are tested/piloted in the field. Brief section descriptions from Holden et al. (2016) are included below:

#### Parcel roster

Households are asked to provide an overview of all parcels belonging to the household, including cultivated, rented and fallowed land, as well as non-agricultural parcels of land. If an agriculture module is included in the survey, it is important that the same system for parcel identification is used in the agricultural module to enable parcel level matching of the land tenure data with the parcel level input, output and investment data collected in the agricultural module.

#### Section 1: Inheritance

How land is transferred between generations and distributed among children within families has large implications for the future land distribution, the extent of concentration of land including by gender. Inheritance may be guided by statutory law in some countries and by customary norms in others.

#### Section 2: Non-agricultural land holdings

Non-agricultural land is particularly important in urban and peri-urban areas. Many of the key policy issues in the area of land (e.g. the need to regularize informal settlements, the scope for converting land use, the ability to use land as a collateral, the level of tenure security, the extent of compensation in case of expropriation, or biased access to land) are at least as relevant in the case of non-agricultural land as they are for agricultural land.

#### Section 3: Agricultural land holdings

In most countries farmers undertake agricultural activities on different parcels of land. Parcels usually differ in terms of types of tenure (e.g. leasehold, freehold, customary); under which system they are held, the mode of acquisition (e.g. purchased, inherited, cleared, etc.), types of documentation used for asserting rights (title, certificates, sales deeds, tax receipts, etc.), land quality, degree of land degradation /erosion, and other physical characterizes.

### Section 3 A: Land holding: Land owned and farmed by the household

This part identifies the type of land tenure system on each parcel of land owned and operated by the household. It also identifies the mode and time of acquisition, the perceived land value, current land use, and basic land characteristics (such as soil type, slope, soil depth, land quality). It is an essential part to link land tenure to land use and productivity analyses.

### Section 3 B: Land holdings: Rented or borrowed in parcels

This part provides information on the extent of land renting in and borrowing and can give indications of the level of activity in the land rental market, who participates in the market and what contractual arrangements are used. This may also be used to analyze factors associated with land rental market participation, access, partner choice, rental contract choice and production efficiency.

### Section 3 C: Land holdings: Rented or lent out parcels

This part will identify which types of households are renting out or lending out their land. Such data may potentially be used to assess factors affecting the willingness to rent out land and how much is rented out. It may help to examine whether secure property rights encourage households to supply more land for rental purposes. It also provides additional information on the scope and nature of the rental market.

### Section 4: Land title or certificate for agricultural land

This part gathers information on the existence of formal documents that confirm ownership or user rights to land. It also assesses the demand for a formal title or certificate and different households' willingness to pay for the document of their choice. It may also indicate something about the ability to pay in countries where it is very expensive to get such documents.

### Section 4: Investments on agricultural land

Investments on the land may be used to increase tenure security but may also be a result of improved tenure security. This part may help to establish the direction of causality and quantifying the impact of tenure security on different types of investments. It requires knowledge of the local practices, as the types of land-related investments to be considered should be customized to the circumstances of the country.

### Section 5: Land rights on owned and rented in agricultural land and knowledge of the law

This part collects information on household members' awareness of formal rights to acquire, hold and transfer land rights. Questions on the knowledge of the law have to be developed specifically in each country given the land-related laws that exist there.

### Section 6: Land conflicts on non-agricultural and agricultural land

This part seeks to establish (i) the relationship between perceptions of risks of land conflict and

productivity at the plot level as well as its impact on the value of land; and (ii) personal experiences of land conflicts and households' choice between the available institutions for conflict resolution. Land conflicts are quite rare phenomena and may only affect directly a small share of the sample who are personally involved in such conflicts. There may also be within-family competition for land that leads to intra-household/family conflicts. Conflicts in the neighborhood or external threats may affect perceptions and the feeling of tenure security and thus investment behavior. This also relates to the next part on tenure security.

## Section 7: Tenure security on non-agricultural and agricultural land

This part analyzes perceptions of tenure security that can have strong effects on land use as well as investments and land transactions. There can be both private and public sources of tenure insecurity and perceptions of such (in-) security may vary across parcels of land that households own or rent. There may also be within-household variation in such perceptions and threats and women may often be more tenure insecure than men.

## Endnotes

1. This is a ‘living document’. As methods improve and new insights develop in the relevant literature, MCC’s approach also aims to evolve and to keep pace. MCC staff will periodically update the guidelines to reflect advances in economic theory and practice, and to provide tools to analyze new LPR investment types as they are encountered.
2. As used in this paper, the term “land” refers to land and all related property and natural resources associated with that land (e.g., water, forests and minerals).
3. Land governance concerns “the rules, processes and structure through which decisions are made about access to land and its use, the manner in which the decisions are implemented and enforced, and the way that competing interests in land are managed” (Palmer, Friccka and Wehrmann, 2009). Land tenure status refers to the particular property right type held by individuals and by groups within this governance system. This can include freehold right, use right (e.g. leasehold tenures), bundles of rights to common resources, or other right types, any of which may be limited in a variety of ways.
4. Removal of regulations (e.g. building height restrictions) that suppress investment can have the same effect—although negative externalities must be carefully considered.
5. Referred to as alienation rights in property law.
6. Including execution of land-attached investments to develop those parcels.
7. Sanjak 2012; Lawry et al, 2014; Higgins et al, 2017.
8. Credit effects are more likely in contexts where beneficiary incomes are higher, plots are larger and/or located in urban areas (and so constitute an asset of value to lenders), contract enforcement mechanisms are strong, and the financial sector is well developed. Even in cases where evidence of a potential credit effect is insufficient for inclusion in ex-ante CBA, ex post evaluation tests for a LPR credit effect may be of interest where the effect is believed plausible.
9. The FAO defines land administration as “the way in which the rules of land tenure are applied and made operational. Land administration, whether formal or informal, comprises an extensive range of systems and processes to administer, including *Land rights*: the allocation of rights in land; the delimitation of boundaries of parcels for which the rights are allocated; the transfer from one party to another through sale, lease, loan, gift or inheritance; and the adjudication of doubts and conflicts regarding rights and parcel boundaries; *Land-use regulation*: land-use planning and enforcement and the adjudication of land use conflicts; and *Land valuation and taxation*: the gathering of revenues through forms of land valuation and taxation, and the adjudication of land valuation and taxation disputes.” (FAO 2002).
10. Since all future income streams from an asset should be reflected in its price (Rosen 1974), the inclusion of both land productivity and value of land as beneficiary streams would double count project benefits. Use of land productivity is generally favored for rural areas, while value of land is often favored for urban areas, for reasons discussed in section III.
11. In contexts where users are not charged the full cost of public service delivery, reduction in service delivery cost may not be fully reflected in land productivity or values.
12. Effects on non-land attached investments or labor activities resulting from increased credit access, ability of households to transfer land to other parties, or reduced land guarding (Field, 2005)—including reduced guarding impacts occurring through increased rural-urban migration (Field, 2005; Deininger et al. 2013; de Janvry et al. 2017)—may also be incorporated where there is evidence that they are substantial.
13. Availability of accurate land ownership records also has potential to enable enforcement of rules (through penalties or subsidies) that require land owners to contribute to the provision of public goods—for example, connection to water infrastructure, or discouragement of electricity theft. A



key example is the implementation of property tax collection, through which LPR investments have potential to reduce the cost and overall distortionary impact of municipal revenue mobilization (Ali et al. 2018). Property taxes are relatively fair and progressive as most benefits of municipal services are capitalized in land values (Collier et al, 2017). Effects on rule enforcement and revenue mobilization may also be included where there is evidence that they are substantial. Guidance on the CBA of revenue mobilization investments, however, is outside the scope of this document.

14. See Feder and Feeny 1991; Besley 1995; Lawry et al 2014; Gignoux, Macours, and Wren-Lewis 2014; and Higgins et al 2017. While the literature is extensive, LPR evaluations have focused on tenure formalization effects, and few have used rigorous experimental designs. For internal users, the literature cited in this document is available in MCC EA's Land Literature Library, located on the share drive here.
15. Both impacts on land-attached investment and returns to increases in land-attached investment are likely to be higher in areas with poor baseline tenure security. In fact, high returns to investment in land attached vs moveable assets is a signal of tenure insecurity. For example, Deininger and Chamorro (2004) find that the return to land-attached investments in Nicaragua during a period of land tenure regularization following high tenure insecurity was 29%, versus a return of 12% to livestock and 3% to machinery investments.
16. In many contexts all land is formally owned by the state, but long-term lease documentation serves as an effective title (e.g. 99-year leases in the case of Zambia) that provide sufficient tenure security.
17. Lawry et al, 2014.
18. Regardless of the legal strength of the right established, credibility, specificity and transparency both to the community and to outsiders through documentation or other means are key.
19. Lanjouw and Levy, 2004 (page 906 and 930).
20. Castaneda and Pfutze, 2013.
21. Lawry et al, 2014 (page 42 and 59).
22. Ali et al, 2014; Saint-Macary et al, 2010.
23. Bellemare 2013. Similar issues were encountered in Mongolia prior to MCC's first compact there. In Burkina Faso, MCC is evaluating the degree to which local institutions are operating and the demand for new registrations or transfers of land rights certificates.
24. Ali, Deininger and Duponchel 2017
25. Deininger and Castagnini, 2006.
26. Goldstein et al, 2015 (page 21). However, it is unclear whether this is due to poor engagement with female headed households or lower interest from female participants, given that the project formalized customary tenure rights which women are less likely to hold.
27. Lawry et al, 2014 (page 62). Exceptions include India and Mexico where individual states governments have authority over land governance and have implemented reforms.
28. Ibid (page 18).
29. Castaneda and Pfutze, 2013. "Customary," as defined by USAID is "traditional authority," or "communities as a whole," depending on country context (Stickler and Huntington, 2015).
30. Lawry et al, 2014 (page 12 and 53).
31. Goldstein et al, 2015 (page 6); Smith 2004; USAID, 2007 (page 13).
32. Lawry et al, 2014 (page 61). Other examples include Madagascar, Benin, Burkina Faso, and Angola.
33. Ali, Deininger, and Goldstein 2014. Reforms were made to remedy the issue based this analysis.
34. See, for instance, Goldstein and Udry 2008.
35. Gignoux, Macours, and Wren-Lewis 2014 (page 8); Goldstein et al. 2015.
36. Goldstein et al, 2015 (page 24). Long term effects on parcel rentals were not yet available at the time of writing.

37. Ali et al, 2015 (page 1).
38. Stickler and Huntington, 2015 (page 4).
39. Dercon and Ali, 2007; Bandiera 2007.
40. Field, Field, and Torero, 2006.
41. A concurrent randomized trial was underway in Mongolia.
42. This is an example of a decentralized, participatory process for land certification that is lower cost than standard freehold land titling approaches. In Benin certificates can be converted into ownership titles so that the right is similar to a freehold title (although the rights conferred by certification are weaker in many contexts).
43. Demarcation also increased the percentage of newly fallowed female-headed household parcels by 1.5 p.p. on a base of approximately 0% (fallowing is an investment in soil fertility). This eliminated the gender gap in percentage of parcels newly fallowed (approximately 1% of male-headed household parcels were newly fallowed). Female-headed household parcels, however, made-up only 15% of parcels in the sample.
44. No difference between treatment and control was observed for trees planted in the last 12 months at endline, suggesting that demarcation led to a long-term increase in the stock of trees but not the investment rate.
45. Bardhan, Mookherjee, and Kumar, 2012.
46. Field 2005; Galiani and Schargrotsky 2010.
47. Models will typically set a floor for land rents on the outskirts at the agricultural value of land.
48. Above some base height (around 7 stories) and below extreme heights (perhaps 50 stories), increases in building height reduce the mean cost per square meter of built space by leveraging fixed costs of construction (Glaeser, 2011).
49. Robinson, Holland, and Naughton-Treves, 2014; Ferretti-Gallon and Busch, 2014.
50. Birungi and Hassan, 2010; Kabubo-Mariara, 2007.
51. Wannasai and Shrestha, 2008.
52. Wendland et al, 2010.
53. Alston and Mueller, 2010; Lawry et al, 2014 (page 19).
54. Wendland et al, 2010; USAID, 2007 (page 8-9).
55. Buntaine, Hamilton, and Millones, 2014 (page 24).
56. Deininger, Carletto, and Savastano, 2007; Nguyen, 2008; Vranken and Swinnen, 2006.
57. Lawry et al, 2014 (page 49).
58. Alston and Mueller, 2010.
59. Holden, Deininger, and Ghebru, 2009; Chand and Yala, 2009.
60. Deininger, Carletto, and Savastano, 2007; Macours, de Janvry, and Sadoulet, 2010; Holden, Deininger, and Ghebru, 2011; Nguyen, 2008.
61. Nguyen, 2008.
62. Macours, de Janvry, and Sadoulet, 2010; Nguyen, 2008; Deininger et al, 2007.
63. Jin and Deininger, 2009.
64. Field, 2005; Field, 2007; Lanjouw and Levy, 2004 (page 918 and 920); Hallward-Driemeier and Gajigo, 2011.
65. Deininger, Carletto, and Savastano, 2007; Jin and Deininger 2009; Macours, de Janvry, and Sadoulet, 2010.
66. Lanjouw and Levy, 2004 (page 901).
67. Stickler and Huntington, 2015 (page 19).
68. Markussen, 2008; Macours 2009; Hallward-Driemeier and Gajigo, 2011; Galiani and Schargrotsky 2010. Note that it is not the case that LPR project effects on investment depend on increased credit access. For example, data from Argentina, Mexico and Nicaragua all show increased investment,

- but little to no impact on access to credit from the issuance of formal land rights, with the exception of a “modest but positive effect” on mortgage credit in Argentina. Likewise, increased credit access resulting from LPR projects does not necessarily result in increased investment. In Zambia, title- and lease-holders achieved greater credit access, but this did not clearly translate into greater investment, implying the loans were used for consumption smoothing.
69. Kemper, Klump, and Schumacher, 2011; Galiani and Schargrodsky 2010; Lawry et al, 2014 (page 63).
  70. Lanjouw and Levy, 2004 (page 934).
  71. Kerekes and Williamson, 2010; Do and Iyer, 2008.
  72. WB Doing Business 2008; Calculations from Deininger and Feder, 2009. Note that the Doing Business indicator refers to the cost to register the transfer of an existing commercial parcel, rather than transfer of a residential parcel or greenfield investment involving land allocation.
  73. WB Doing Business 2010 and 2013; Gainer, 2017.
  74. Jacoby and Minten, 2007; Deininger, Ali, and Alemu 2011; Holden, Deininger, and Ghebru, 2009.
  75. Burns et al, 2007; Deininger, Ali, and Yamano, 2008. Although, this certification process involved little mapping, which may limit strength of the awarded rights. LPR investments may also improve the efficiency of and reduce dead weight loss from revenue mobilization, although these effects are not covered by this document.
  76. These benefits may manifest both as a direct increase in land value and as an incentive to make investments that increase land value beyond the investment cost. Where land users are not charged the full cost of public service delivery, however, land value changes may either over or understate benefits.
  77. See, for instance, Fuller and Romer 2014. Urban informal settlements are, “contiguous settlements where inhabitants are characterized as having insecure residential status, inadequate access to safe water, inadequate access to sanitation and other basic infrastructure and services, poor structural quality of housing, and overcrowding” (UN-Habitat, 2003).
  78. Cantuarias and Delgado 2004; and Durand-Lasserve and Selod 2009
  79. Nunns and Rohani, 2014.
  80. Macours, 2009; Deininger and Castagnini, 2006; Deininger and Jin, 2006. In addition to affecting perceived tenure security, land conflict reduction may also have a more direct economic effect through the channel of reduction in the administrative and user cost of resolving land conflicts.
  81. Santos, Fletschner, and Daconto, 2014; Ali, Deininger, and Goldstein, 2014; Deininger, 2007. “Succession-related uncertainty” is the probability of a household reporting that it is unknown who will inherit a parcel.
  82. This typology includes common MCC LPR investments; the typology may expand in the future as MCC country teams identify new investment types to effectively address the root causes of binding constraints in particular country contexts.
  83. The economist should closely collaborate with the M&E lead, land sector lead, and gender and social inclusion (GSI) leads both in selecting existing data and in any collection of original data. These team members must review any instrument used for original data collection to inform economic analysis. See section III for guidance on questionnaire design and data collection.
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  85. Note that investments of this type correspond to investments at level 4a (Sector Policies) and 4b (Institutions of Sector Governance) in MCC’s PIR CBA Guidelines.
  86. See Henderson, Regan and Venables (2017) for an example of data requirements for a monocentric

city model.

87. Note that this comprehensive logic, however, includes several benefit streams for which existing evidence is insufficient for inclusion in ex-ante CBA models.
88. For a comprehensive Evaluation Land Logic, see Lisher (2018).
89. In keeping with standard CBA practice, none of MCC's economic analyses attempt to assess a counterfactual where the same items are financed, with some probability, by other public entities or donors.
90. For example, where threats are primarily from individuals or entities external to a particular area, and community-level land governance institutions exist, registration of group rights may be sufficient to secure tenure. Whereas, where the main threats come from within a community (or household), then strengthening household or parcel-level land rights may be necessary.
91. The minimum time required to implement an LGAF is 4 months, but the exercise can take substantially longer. See the LGAF website here: <http://www.worldbank.org/en/programs/land-governance-assessment-framework>. Sanjak and Donovan (2016) review other lower cost and time intensive tools for assessing land governance. USAID's land country pages, the international land coalition (ILC) Dashboard and forthcoming SDG 1.4.2 data on secure tenure (documentation and perceptions) are also useful references.
92. Care should be taken to consider the quality of this administrative data, however, in drawing any conclusions. In many MCC partner countries, registry data is substantially incomplete, out of date, or otherwise inaccurate.
93. Doing Business indicators appear in many cases to measure de jure rather than de facto conditions (Hallward-Driemeier and Pritchett 2015). Actual time and financial costs within a country may also vary substantially by firm and transaction type. For this reason, doing business indicators should be analyzed in combination with other sources, preferably data allowing disaggregation by firm and transaction type.
94. For more information, see the Doing Business Registering Property Methodology webpage, here: <http://www.doingbusiness.org/Methodology/Registering-Property>.
95. Deininger and Chamorro (2004) find that the return to land-attached investments in Nicaragua during a period of land tenure regularization following high tenure insecurity was 29%, versus a return of 12% to livestock and 3% to machinery investments.
96. Available for 62 countries as of February, 2017 at [eba.worldbank.org](http://eba.worldbank.org)
97. Where these procedures involve multiple institutions (e.g. the registry and judiciary for land conflicts), administrative data should be obtained from each institution to cross-check.
98. Contact MCC M&E (Jenny Lisher) for suggestions on which data catalog land module may be most useful for your context and objectives.
99. The literature cited in this document is available in MCC's Land Literature Library, located on the share drive here. When complete, MCC M&E's land literature database spreadsheet will be added here, and will include information on experimental and quasi-experimental studies' primary research question(s), intervention/situation type analyzed; methodology applied, exposure period allowed for effects to materialize, and outcomes for which impacts were estimated.
100. Where a LPR investment is expected to increase credit access, a large portion of the incremental credit may be applied to land-attached investment so that the welfare gains from this incremental investment are partially or fully reflected in land values/productivity. If land value/productivity is included as a benefit stream in these cases, then welfare gains from non land-attached investments must be separately quantified if substantial, or excluded if insubstantial.
101. Alternatively, the value of the equivalent annual payment received in perpetuity beyond the 20th year can be subtracted from the price change. Or, equivalently, the remaining value in perpetuity of other cost and benefit streams in the model can be added to the last period.

102. Note that past MCC LPR credit investment CBAs have sometimes erred in assuming that the opportunity cost of loan recipients' own capital contribution is zero, that the real interest rate repaid to the mortgage lender is close to a pure welfare gain (in one case assuming a mortgage transaction cost equal to just 2% of the loan), and that the loan recipient and lender's profit are an annual benefit into perpetuity without accounting for depreciation of capital investments financed by the mortgage loan or the possibility that these loans are used for consumption smoothing.
103. In some contexts, use of appropriate methods will reduce variation in reported land value within implementation clusters. In these cases, the statistical power of the estimator may lower to the point that relevant effects sizes are not detectable and price cannot be used as an outcome indicator.
104. Although rental rates are more likely to be available, the relationship between tenure security improvements and the rental rate is less clear. Improvements in tenure security may in fact reduce rental rates as the risk of losing rights to a parcel that is rented out diminishes.
105. In some contexts, there may be a sufficiently high number of land transactions to have statistical power to use actual sale prices to estimate program effects, but the required data is unlikely to be available and the method would introduce sampling bias as the price of parcels that are not transacted is unobserved. For cases where such data is available, it is recommended that regressions using both the subjective land price and actual land sale price as the dependent variable be run to check for robustness.
106. Geographic discontinuity designs using spatial fixed effects are also useful, although appropriate data is more unusual (Ali, Deininger, and Goldstein, 2014).
107. In the case of agricultural investment, use human capital characteristics of the individual who makes decisions regarding cultivation of and controls output from the parcel.
108. Except in contexts where the analyst believes title is likely to affect credit access.
109. See Besley (1995) for an instrumental variable application to cross sectional data.
110. Millennium Challenge Corporation, 2018.
111. See MCC's PIR CBA Guidelines for additional guidance and caveats. For example, the PIR CBA paper also identifies other circumstances in which PIR and non-PIR CBA analysis may be combined, including where PIR costs are low compared to costs of separate analysis, and where PIR supports sustainability of non-PIR investment.
112. The peer reviewer should request a clear justification for cases where PIR and non-PIR components are not separately modeled.
113. When considering use of stated preference questions, however, the analyst must carefully consider whether targeted respondents would have sufficient understanding of and information on potential amenities or services whose benefits they are asked to assess.
114. For off-grid electrification, for example, World Bank Independent Evaluation Group 2008 shows that applying the wrong functional form for the demand curve can overstate consumer surplus versus a log-linear demand curve by up to eight times in extreme cases (pg. 131-139).
115. See, for instance, Goldstein and Udry 2008.
116. MCC M&E Division 2017 (internal document)
117. Higgins et al, 2017. See also 3ie's Evidence Map for Land Use Change and Forestry here: <http://gapmaps.3ieimpact.org/evidence-maps/land-use-change-and-forestry>
118. Land administration reform was the largest of 5 activities included in MCC's Private Sector Development project. The other activities originally included modernizing the commercial legal system, strengthening payment and settlement systems, supporting the provision of credit bureau services (including assisting the roll-out of a national ID scheme), and training and outreach to support gender equality in economic rights. The credit bureau services and payment and settlement systems activities were later cancelled.

119. Orgut-Cowi contract (i.e., Dec 2012).
120. IMF SISA (Jan 2007), p. 81 (Table 35: Financial Soundness Indicators for the Banking Sector).
121. DUAT is from the Portuguese Direito de Uso e Aproveitamento dos Terras, meaning the right of use and benefit of land.
122. USAID also has sample instruments available for download at [www.usaidlandtenure.net/data](http://www.usaidlandtenure.net/data).